THE IRON TRADE REVIEW

VOLUME XXVII. CLEVELAND, O. APRIL 5, 1894. CHICAGO, ILL. NUMBER 14.

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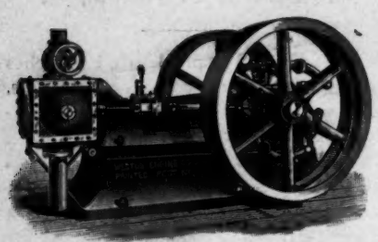

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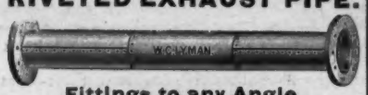

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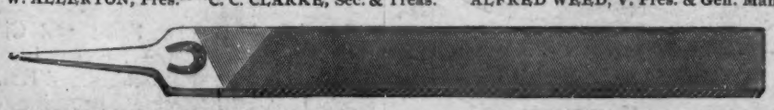

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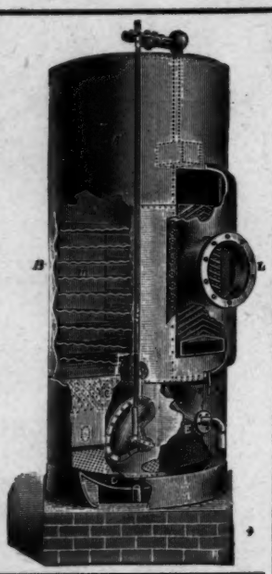

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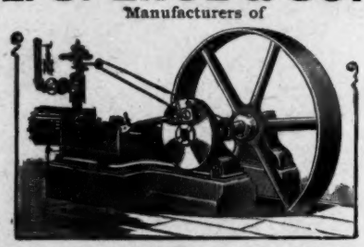

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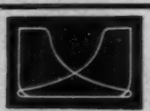

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THE IRON TRADE REVIEW

VOLUME XXVII. CLEVELAND, O. APRIL 5, 1894. CHICAGO, ILL. NUMBER 14.

THE WEEK IN IRON CIRCLES.

GENERAL FEATURES.

The reductions in pig iron rates by Southern roads, going into effect on Monday, April 2, are the immediately important factors in the crude iron market. Fifty cents a ton to Ohio River points and as high as 85 cents to some points in the Central West represent the size of the concession, which enable Southern producers to enter upon a vigorous campaign for business in teritorry from which they have been well nigh barred for several weeks. To Cleveland, for example, the new rate is $3 from Birmingham, Ala., as against $3.85 formerly. This means Southern gray forge at about $9 Cleveland, and it needs scarcely be said that the new basis has brought increased business to Southern furnacemen. For a week past there has been a succession of good-sized sales in the principal markets for Southern coke irons and it is probable that the quotations made were based on advanced assurances of the impending freight changes. Eastern pig iron sellers who have been feeling the effect of unusual competition from the Pittsburg and Valley districts, the past two weeks, must shade quotations still further now that Southern producers are freshly invading their territory. The keenness of the struggle between the sections over finished material contracts is now to be duplicated in pig iron. Pipe works have been buying to a considerable extent in the past week and car wheel makers have been doing a trifle more of late. Manufacturers of iron along the Ohio river, with the reduced freights on their raw material expect to be able to compete on finished products in sections from which they have been shut out for some months. The whole movement to a lower freight basis is likely to give more stability to prices. Both pig iron and finished material have been quoted delivered to an increasing extent and often the prices have indicated a weakening by the producer, when in fact the difference was due to an inside freight rate. It is patent that there will be no inside freights now. The Pittsburg market shows a better movement in Bessemer pig and in steel billets. The latter are maintained at $15.60@$15.70, Pittsburg, but Eastern buyers do not take hold with any avidity at the asking prices of $17.25 and upwards, Philadelphia. There is still an absence of large work calling for finished material, and the mills do not accumulate orders, one week's aggregate of new business evening up with the week's output. The strike in the Connellsville region is an element in price calculations for the immediate future. There is but one producer that has any accumulated stock of coke and should the strike extend there are, of course, possibilities of short supply and higher prices. The men were never less prepared for a siege and with many of them anxious to work the probabilities are that at least partial activity can be maintained.

THE CLEVELAND OUTLOOK.

Ore sales of a few thousand tons each of Bessemer are being made with every week and one recent transaction involving a round lot of non-Bessemer ores is reported. Very little beside this has been done in non-Bessemers to be brought down in 1894, stocks on the docks being ample for such requirements as have come up, and these have been of limited amount. At the rate Bessemer ores are being smelted in the districts nearest Cleveland, 24 out of 26 furnaces being active in the Pittsburg district, 14 in the two valleys, while the active list in the Wheeling district is about to be increased by one, those who have set their stake at a consumption of 6,000,000 tons of Lake Superior Bessemer in 1894 are confident that the latter portion of the season will see a new buying movement. This is counted upon to furnish a market for ores thus far neglected. Many vessel men are pinning their faith to the same theory and are content to keep their boats inactive for the early months of navigation. The only ore charter of special interest in the week was the covering of of a lot of Marquette range non-Bessemer at 80 cents from Marquette to Tonawanda.

Pig Iron. Another furnace, the Claire, at Sharpsville, Pa., idle since last August, is about to go in blast, and a similar order has been given for the Belmont furnace of the Wheeling Iron & Steel Co. The production of Bessemer pig is unusually heavy. A transaction at $9.75, furnace, is reported from the Shenango Valley and a 10,000 sale for Cleveland delivery was made in the past week on a similar basis. The new rates on Southern pig iron promise to increase the shipments from that section to Northern Ohio points; this is on the assumption that Southern furnaces will give buyers the benefit of the reductions in freights, as they appear to be doing. Gray forge at $9, Cleveland, would be the equivalent of the $6 Birmingham quotations recently made, and it is quite certain that no valley furnace can approach $8.40, which is the furnace equivalent of $9 delivered in Cleveland. Foundry irons are weaker.

Finished Material. There is nothing encouraging to report either as to prices or demand. It is a question whether the latter has been holding its own. Prices on all lines of products are weaker and the difficulty of getting buyers to specify on even the small contracts that have been the order is aggravated as the market drops. Valley mills have increased their operations but slightly under the reduced scale, and mills at Warren and Girard, which the men hoped to see reopened, under the $4 rate, will remain boarded up. Prices on bar iron range from 1c. to 1.10c. and soft steel bars are quoted at 1.05c.@1.15c. at mill. In structural material, beams are most called for, but the demand is in small lots, and sales are on a 1.15c. basis at mill. Inquiries for building material promise some improvement, should all materialize in orders. Old material shows lower prices all around and there are no strong signs of bottom.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

The event of the week is the reduction of freight rates on Southern iron to 65c a ton, which went into effect Monday of this week. It is a question what effect this reduction will have upon the market. Some of the Southern furnaces claim that it will be accompanied by increased orders for their product, while others agree with the Northern furnaces in believing that it will have no effect, save to force the Northern dealers to lower their prices to compete. The week has made a little better showing as regards sales than the week previous, and the outlook seems to indicate that business will be better within the next three or four weeks. The expected large sales of rails have so far failed to materialize.

PIG IRON.—Very little has been talked about for the past several days save the reduction of freight rates on Southern iron. This has lowered the price of Southern iron 65c—the full amount of the reduction. It was stated this week by a prominent Northern furnace man, that the Northern furnaces would meet this reduction, and not only do that, but meet any further reduction that might be made by Southern iron. The Northern man stated that they do not propose to lose the gain they have made on Southern iron in the past several months, but rather expect to increase it. Sales of local iron in the past week were not quite as large as the week previous, but at the same time a fairly good tonnage was secured. Southern iron sold fairly well in lots of 20 to 200 tons, and one or two sales of 400 and 500 tons were made. Nothing has been done in Lake Superior charcoal.

BARS.—Buyers appear to have come to the conclusion that the present low prices can not be bettered, and are figuring quite extensively upon purchasing. Several good sized contracts were placed in the past week, and it is expected that several more running up into the thousands of tons will be placed in the coming week. Prices on iron are mainiained at 1.10c to 1.15c on good specifications, Chicago. Steel bars have had a very good sale and the demand seems to be increasing. Sales have been made at 1.10c, Chicago, but the local mills are holding out for 1.25.

STRUCTURAL MATERIAL.—No new business has been closed in the past week and the only trade has been in small lots. The demand appears to be increasing for this class of trade, and it is expected that business will be considerably better in the near future. Quotations are unchanged. Beams and channels, 1.40c to 1.45c; angles, 1.35c to 1.40c; plates, 1.35c to 1.45c; tees, 1.55c to 1.60c.

RAILS AND TRACK SUPPLIES.—A few small orders for rails have been received, but nothing of any consequence. Prices are as last reported. Rails, $25 to $27, according to quality; splice bars, 1.40c; track bolts, 2.40c to 2.45c; spikes, 1.75c to 1.80c.

BILLETS AND RODS.—The demand for billets continues, but no large sales have been made in the past week. Rods are still quiet though there is a little better inquiry. Quotations are unchanged at $17.75 for billets and $25 for rods.

PLATES.—There is no change in the situation and while orders are a little more frequent, they are not increased in size. Quotations are unchanged: Tank steel, 1.35c to 1.45c; flange steel, 1.70c to 1.80c; fire-box steel, 3 75c to 4c; boiler tubes, 75 per cent. discount.

MERCHANT STEEL.—The inquiry is a little better and sales have been made for small lots, aggregating quite a good tonnage, but no large orders have been placed. Prices are as last reported: Open-hearth spring, machinery and tire steel, 1.85c to 1.90c; crucible spring, 3.50c; machinery, 4.50c to 4.75c; tool steel, 6½c and upwards.

SHEETS.—Black sheets have been quiet, with only small sales and the outlook is not particularly encouraging. No. 27 common iron is quoted at 2.30c to 2.35c, and No. 27 soft steel, 2.35c to 2 40c. Galvanized iron is selling fairly well at 75 and 10 and 5 per cent. off for mill shipments.

OLD RAILS AND WHEELS.—Nothing has been done in this branch of trade and quotations are unchanged. They are nominally as follows: Old iron rails $10.50; old steel rails $7 and $10, according to length; old wheels $10.50 to $11.

GENERAL MARKET RESUME.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. An improvement in the situation is to be noted here, but confined to Bessemer pig iron and steel billets. It need not be said that there is no betterment in price, even on the material named. Billets have been sold for prompt delivery at $15.60 and this price has been shaded a trifle on deliveries extending through June. Bessemer pig has ranged from $10.25 to $10.40 and several lots of from 1,000 to 5,000 tons have been marketed. Finished material does not show any change. Mills are fairly well supplied with orders and inquiries are somewhat more active. Foundry and mill iron are still much depressed and the recent freight reductions on Southern irons promise to carry prices even lower. Scrap is dull, with few sales and little inquiry. In structural material, sales are of small lots, at 1.15c@1.20c. for beams and channels; angles and universal plates, 1.10c@1.20c. Tank steel is quoted at 1.10c@1.20c.; flange steel, 1.45c @1.55c.; No. 27 sheets at 2.30c. at mill.

Louisville. Orders for iron continue to be small with no change in price; interest in the market, however, has been considerably affected owing to the determination on the part of Southern roads to make a radical change in freight rates. The reduction to Ohio River points is 50 cents, and to some sections north of the river 65 cents per ton. It is felt that this will result in increased sales of iron at Northern points where competition from Ohio and Chicago furnaces has recently been very keen, and that it will put manufacturers along the Ohio River in position to compete on finished products in sections from which for some months they have been shut out. Another effect is that of more stability in prices, as in the past there have been inside rates of freight and prices at which iron has been quoted delivered have often seemed to be extremely low, and to show no stability on the part of the furnace, when in fact the quotations arose from concessions in freights that were not generally understood, while the furnaces themselves were holding prices firm. Car shops in the immediate vicinity have no orders and do not know when they will start up. Rolling mills are using but small quantities of iron, finding it to their interest to buy scrap more largely as it is selling extremely low. For car wheel irons there is very little demand, and but very few of the car wheel furnaces are in blast.

Cincinnati. The business of the week in pig iron has aggregated a large tonnage. The general improvement is slight, but it is appreciable and sufficiently marked to give encouragement. Prices are unstable. The Southern furnaces have been heroically meeting competition in the area they have felt neutral territory and now have further assistance in a 50-cent freight reduction. The car works and car wheel makers are doing a trifle more than last month.

THE IRON TRADE REVIEW

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CLEVELAND:
27 VINCENT STREET.
A. I. FINDLEY, Editor.

CHICAGO:
1141 MONADNOCK BLOCK.
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ENTERED AT THE POST OFFICE IN CLEVELAND, O., AS SECOND CLASS MATTER.

APRIL 5, 1894.

THE BEST STEEL-MAKING POINT.

The original decision of the Johnson Co. to go to Lorain, 23 miles west of Cleveland, with its new steel plant, has been adhered to and, as noted elsewhere, what remains is to agree upon details as to the performance by the authorities of Lorain of improvement work in the river channel. It is significant that the decision was finally reached to locate close to Cleveland, notwithstanding that all the plans of the company in the beginning centered about some point in the valleys or in the Pittsburg district, or in the Connellsville coke region. The data gathered by the Cleveland Chamber of Commerce, and verified by the careful investigation of Messrs. Johnson and Moxham, of the Johnson Co., satisfied them that Cleveland is the cheapest steel making point in the country—the most advantageous point for a steel plant, taking into account both the assembling of materials and the distribution of product. The economies possible in pig iron making at Cleveland were pointed out, and reliable figures given, in a recent issue of this paper. General Manager Moxham has confirmed this statement in his conferences with the Cleveland Chamber of Commerce; and the Johnson Co., in its letter to the officials of Lorain, says:

> We have become convinced that it is to our advantage to locate our plant in the vicinity of Cleveland, O., for the reason that we are satisfied that, under proper conditions, steel can be manufactured and distributed more cheaply from this locality than from any other in the country.

The only obstacle to the location of the plant in Cleveland or on its outskirts was the lack of harbor and dock facilities, in connection with the amount of land required by the company. Yet the enterprise is to be a Cleveland one, transacting all its business in Cleveland and bringing to a point thus near to Cleveland on the lake shore, a large population that will indirectly add much to the city's business.

The economies in manufacture which are possible to the new steel works, the expressed intention of Manager Moxham and his associates to manufacture their own coke after the most advanced German practice, and the fact that steel rails of standard sections, hitherto not a part of the Johnson Co.'s product are to be manufactured on a large scale on the lake shore, invest the whole enterprise with an importance possibly not appreciated at first thought. When it is remembered, in the same connection, that plans are under way for a new rail mill in Cleveland and that the new steel plant at Youngstown is to include a rail mill, it will be seen that Pittsburg competitive possibilities will yet be sharply tested by makers closer to the ore supply and located on the great highway of the country's East and West traffic.

We believe that the revelation which has been made to the Johnson Co. as to the advantages of a site in the Cleveland district will serve to turn attention to lake shore points, both as manufacturing and distributing centers, in a way that has not been possible heretofore. This applies not only to crude iron and steel, but to all the manifold lines of finished product in the evolution from the pig and the billet.

TAXATION PROBLEMS.

With the return of the property listing season, tax inequalities become a live issue, and where legislatures are in session the pending taxation bills are having the largest share of public attention and discussion. It illustrates the incoherence of the patched and shredded tax statutes of the various states, and the lameness of our revenue-raising systems, that Massachusetts should be seriously proposing to adopt laws which in Ohio, after being operative for years, are now clamored against as unjust and an injury to the State. The *Manufacturers' Gazette*, of Boston, calls attention to the efforts now being made in the Massachusetts Legislature requiring corporations in that and other States, which have a usual place of business in Massachusetts, to file each year a list of their shareholders, and requiring shareholders of foreign corporations once taxed where their property is situated, to be again taxed in Massachusetts. Ohio has lost scores of citizens to other states and millions of capital becaues of the enforcement of this very unjust requirement in the case of holders of foreign stocks. Efforts to have the practice changed have failed thus far, but that fact does not lessen the injustice of this species of double taxation.

The majority of the Massachusetts legislative committee, that, like similar committees in other States, was charged with the revision of the tax laws, reports sustaining the right of the State thus to tax foreign stocks held by its citizens. The point is made that exemption offers a premium for investors to go outside the State, and court decisions are cited to the effect that the situs of personal property is fixed by the domicile of the owner. The narrowness of the position that a citizen must pay a penalty for investing in a business carried on beyond the borders of his State is only equaled by the absurdity of the requirement viewed in the light thus thrown upon it by the minority report:

> Supposing a citizen of Massachusetts owns a farm in Connecticut, or in Texas, for that matter; so long as he owns it as an individual, or even as a partner in a firm, he cannot be taxed for it here, but if for any reason he transfers his real estate to a corporation, exchanging his paper title deeds for paper certificates of stock of equal value, he becomes liable to be taxed for that value. If it be right that the citizen should own real estate in other States and enjoy its revenues while residing here, without accounting to our assessors (and no one disputes this), it is right that he should own the evidences of real estate, whether in the form of title deeds or shares of stock.

Getting behind the ostensible reasons for the various schemes of cumulative taxation that are invented by legislators anxious to make records to go before "the people,"

the thought at the bottom of all of them seems to be that the man who has acquired more property than the average citizen is better able to pay a higher rate of taxation and therefore ought to bear it without grumbling. This, moreover, is practically the length and breadth of the argument in favor of a tax upon incomes above a certain amount, as provided in the Wilson bill.

Another injustice against which there are loud protests in States now imposing it, is contemplated by Massachusetts tax reformers, namely, the imposition of a tax upon mortgage notes on real estate. The usual justification of this duplicate tax is that real estate is notoriously undervalued and therefore the portion represented in the mortgage is only fractionally taxed over and above the face of the mortgage. This is a defense of one lame tax law by another lameness and does not excuse the State, which has the remedy for both in its own hands.

In Ohio, there has been vigorous agitation for several months past against the species of tax injustice represented in the Morgenthaler law. This statute creates an inquisition for the placing on the duplicate of unlisted foreign stocks and other omitted property. The detective who gathers the easily procurable evidence as to the property holder's interest in foreign companies—this class of property constituting the bulk of the omissions—is given 25 per cent. of the back taxes recovered and the treasurer and auditor of the county get 5 per cent. and 4 per cent. respectively for performing a duty imposed upon them by the law. Very little labor, and certainly no skill or capacity, beyond the qualities that make a successful detective, are required of an inquisitor and yet this enormous percentage is given him out of money that ought to go to the State if foreign stock taxation is just. So strong is the feeling aroused by the demagogic arraying of class against class, by certain politicians and newspapers, that it has been impossible thus far to secure such an amendment of this law as shall cut off its spoils feature and put its execution upon the officers charged with the collection of taxes.

The organizations of manufacturers in Ohio and other States, to protest against taxation practices that are handicapping capital and hurting the States thus discriminating against it, are not aggregations of "tax dodgers," but the concentration of the best business brains of the states upon a difficult and all-important problem. The whole tenor of much of the writing and the whole course of much of the legislating on this subject, can have but one logical basis, that there must be a penalty upon capital, which is nothing else but labor stored. It seems to proceed upon the assumption that if a single tax is justly imposed upon little capital, a double tax may be put upon large capital, because there is more of it. This dangerous doctrine that would sweep away the principle of equal taxation, always recognized in our government, at least in theory, is getting more and more support in State and National halls of legislation. If manufacturers are unusually active and are more frequently heard from by their legislators, it is because they have had increasing reason to fear that prejudice and clamor have prevailed against the equities of the case. It is not that business men are getting too much into politics but rather that they have for years been too little in politics. Eternal vigilance is more and more the price of just laws.

LATEST reports from the Connellsville coke region tell of loss of life in Wednesday's encounters between the murderous mobs of strikers and the deputies set to guard the works. It is evident that more bloodshed and destruction of property will ensue before the present outbreak is suppressed and it would seem that nothing but military force would be adequate to that end. The condition of the coke workers certainly is and has been deplorable, and the ruinous competition among operators which has made the business profitless and forced wages to such a depth, is not less lamentable. But it is only one phase of a desperate struggle for business in a time of shortened demand and of widespread depression, which has caused producers to disregard considerations ordinarily weighty. It is conceded on all hands that there is no profit in the business at the prices prevailing for the past three or four months, but workers do not at all appreciate the fact that while output has gradually increased there has been no improvement in price; rather the contrary tendency. The strike has been made at a time when it cannot possibly win and loss of life, loss of property and starvation to dependent women and children can be the only outcome. Yet the ignorant fury of this ungovernable mob of Huns must spend itself. Reason cannot be appealed to, and the only recourse of the authorities is to armed force.

A FEATURE in connection with the pig iron industry of Great Britain is the steady decline in stocks on hand at the end of the year. In spite of the depression last year a slight inroad was made upon the accumulation at the end of the preceding twelve-month. For the past six years the figures are as follows: Dec. 31, 1888, 2,588,708 tons; Dec. 31, 1889, 1,951,443 tons; Dec. 31, 1890, 1,393,041 tons; Dec. 31, 1891, 1,232,277 tons; Dec. 31, 1892, 872,095 tons; Dec. 31, 1893, 868,730 tons.

Exceptional Rod Mill Records.

Several records of exceptional operation of wire rod mills have been published lately. At Pittsburg the following newspaper statement has been made on data furnished by the Oliver & Roberts Wire Co.: "The Oliver & Roberts Wire Co. made in their Ninth street rod mill during the month of March, 7,000 net tons of No. 5 wire rods. The largest amount made on a single turn was 348,000 pounds, and on a double turn 667,000 pounds. This output is believed to be the largest ever made in a rod mill either in this or in any other country in one month. The wire drawing mill located at South Third and Fourth streets, drew into finished wires 7,000 tons during the month of March. This is a greater output than can be shown by any other wire drawing mill in the world, according to the statements of the firm. Over 3,000 tons of the above product were galvanized in their works. About 60,000 kegs of nails were made out of this product, and 3,000 tons of barbed fence wire."

The American Wire Co., of Cleveland, made a larger single-turn record, in the month of March. During the week ending March 17 the Garret rod mill of this company, rolled 1,524 gross tons of finished merchantable rods, in 11 turns, aggregating 108 hours, *i. e.*, ten hours every day except Saturday, and on Saturday, eight hours. The best turns were 352,000 and 357,000 pounds respectively, made on Wednesday, day and night, respectively.

THE Lodge & Davis Machine Tool Co., of Cincinnati, O., have just received an order from Winklemann Bros., Valencia, Venzuela, for several of their machine tools, including one large lathe 21 feet long. They also have received an order from Carlos Albert & Son, of the same place, for one of their crank shapers.

MESSRS. GEO. H. SIBELL & CO., 614 Continental National Bank Bldg., Chicago, have recently been appointed sales agents for the Chicago Horse Shoe Co.'s horse and mule shoes.

AMONG THE IRON MINES.

The men employed at the Buffalo mines, Negaunee, are all at work developing the new Bessemer deposit which has made a good showing thus far. The ore is known as Regent and is a hematite of excellent quality.

The officers of the Lake Superior Iron Co., on the Mesabi, make this statement that contradicts reports afloat recently as to a change in their relations with the Lake Superior Consolidaten Mines: "The Lake Superior Iron Co. early last summer made to C. W. Wetmore and others an operating contract by which they assumed control of the property, and under which they were to furnish money to operate the mine. The consideration was a cash bonus of $250,000. In the transaction not a dollar's worth of the company's stock was transferred to Mr. Wetmore or any one else. This operating contract was assigned to the New York & Mesabi Iron Co., and by that company was assigned to the consolidated mines, where it is now held. Since the assignment of the operating contract to the consolidated there has been absolutely no change in the situation. The relations between the Lake Superior Co. and the consolidated have been and are now of the friendliest character."

Confirming the statement about the Chapin, in these columns last week, is the following from Trustee R. C. Flanigan: "Proceedings to foreclose the mortgage have not been commenced. The Chapin Co. has not defaulted on its bonds. Its bonds due February 10 last, were paid, principal and interest, to the last cent. The second installment of its bonds of the first class will not mature until August next. Because of the company's failure to pay taxes, the whole amount for which the mortgage was given may be declared due and foreclosure proceedings instituted. That option has not yet been exercised, although the question whether proceedings shall be commenced now or delayed indefinitely is being considered." Prospects of the operation of the Chapin this year are not bright.

In a suit at Milwaukee against Chas. A. Noyes, for the sale of his stock in the Anvil Mining Co., to meet an assessment of $1 a share made last November, the following statement as to the company's condition was brought out: Assets—Ore at mine, $14,235; machinery, $44,172; cash on hand, $5.41; ore in Cleveland, $2,626.25; total, $61,039.64. Liabilities—Due for October pay roll, $535; bills payable, $29,402; unpaid salaries for 1893, $4,100; due for advances, $1,000; total, $46,900.

The Franklin mine on the Mesabi has resumed and 150 men are now employed. To surfacemen and laborers $1 a day is being paid. Underground work is being done on contract. At the Mountain Iron there is also a renewal of operations.

The Columbia mine (formerly Shafer) at Crystal Falls may soon be active. Thus far 25,000 tons of ore have been sold and negotiations are pending for 50,000 tons additional.

At a meeting of the stockholders of the Lamont Iron Co., in the Rookery, Chicago, last week, the following officers were elected: E. E. Crepin, president; H. A. Smith, vice president; J. C. Parmily, treasurer; R. Floyd Clinch, secretary; Frank Scadden, general manager.

Since Mr. Angus Smith, the principal owner, resumed control of the Aragon mine, it is stated that sales of 75,000 tons have been made, and there is now on stockpile 50,000 tons additional.

S. R. Ainslie, of Chicago, fee owner of the Ohio mine on the Mesabi, has served notice on Dr. Fred Barrett and others of the Ohio Mining Co. that the lease to them is canceled and the property re-entered. He alleges the non-payment of royalty amounting to $26,000 and failure to mine the property. The Ohio Mining Co.'s agreement calls for 25 cents per ton and its sub-lease to Sheridan and Weimer, recently forfeited provided for 65 cents royalty on a 150,000-ton minimum. The Ohio Mining Co. claims that it has paid Mr. Ainslie what is due him under its agreement.

The Rouchleau-Ray Iron Land Co. is reported to have closed an option for the purchase of 120 acres of Mesabi range lands, on which it has found a large body of Bessemer ore. A Duluth dispatch also reports that the McInnis Iron Co., of which David T. Adams is the principal stockholder, has developed an important Bessemer deposit near Everett.

Several hundred cars of Norrie ore have been shipped to the Ashland docks and Marquette range mines have begun to send forward ore to Marquette.

PERSONAL.

Mr. B. J. Williams, who has been the Secretary and Treasurer of the Shelby (O.) Steel Tube Co. from its inception to the present time, has tendered his resignation for the reason that the banking business, with which he has long been connected, demanded more of his time than he could devote to it and hold the other position. Mr. J. C. Pattison was elected his successor. The business of this company has gone forward from the very first, March showing a shipment of nearly 350,000 ft.

Mr. W. M. Wilson, who was formerly with the Otis Steel Co., of Cleveland, has resigned from that firm and connected himself with the Carbon Steel Co., of Pittsburg.

Andrew Potter, Superintendent of the Deming Co.'s pump works at Salem, O., died suddenly of heart disease, on March 26. He was born in Cuyahoga Co., O., Jan. 24, 1842, and attended Hiram College while it was in charge of James A. Garfield. In 1860 he entered the machine shop of Sharp & King at Salem; later was employed in the navy yard at Washington and afterward went to China, remaining there 10 years, becoming chief engineer of a river steamer carrying teas and silks. Returning to Salem he entered the old works of Thos. Sharp & Co., remaining several years, later traveled for two years for the Buckeye Engine Co., and then accepted the superintendency of the Deming Co.'s works. He was also a director of the company.

W. B. Leeds, for several years superintendent of the Richmond, Ind., division of the Pan Handle, has resigned and will retire April 1. Mr. Leeds' acquisition of a controlling interest in the American Tin Plate Co., of Elwood, Ind., and his election as president of the company require that he devote his time to that industry.

Mr. F. A. Emmerton is in charge of the Cleveland office (804 Perry-Payne Building) of Hollis & Emmerton, analytical chemists and mining and metallurgical engineers. The Chicago office, 1232 Rookery, is in charge of Mr. Hollis.

The Johnson Steel Plant Goes to Lorain.

Hon. Tom L. Johnson and A. J. Moxham, accompanied by a committee of the Cleveland Chamber of Commerce, went to Lorain, O., on Friday, March 30, and after an inspection of various sites Messrs. Johnson and Moxham decided that the Johnson Co.'s new steel plant should be located at Lorain provided conditions they imposed are complied with by the village authorities. Black river affords the harbor needed for vessels carrying freight for the steel works and the necessary dockage facilities will be available as soon as the dredging for which the company also stipulates is completed. Options have been taken on a large tract of land and these will be closed as soon as the village authorities agree to make the desired changes in the river. It is necessary to straighten it, and broaden and deepen it, so that eventually it shall have a width nearly twice that at present, for a distance of four miles back from the city. It is understood that the village authorities will agree to do what is asked and the probabilities are that ground will be broken for the new plant within a month.

Incorporation papers have been drawn in Cleveland for the Johnson Co., whose residence is to be Cleveland, all its offices being located in this city. The purpose of the company is set forth to be the manufacture of steel, iron and coke, with all mining, producing and purchasing incident to such manufacture. The incorporators are Tom L. Johnson, A. J. Moxham, Andrew Squire, James Parmelee and H. J. Davies. The capital is to be $5,000,000, in shares of $100 each.

NOTWITHSTANDING that many of the fire brick manufacturers have up to this time not resumed operations at their plants, the American Fire Brick & Clay Co., of Mineral Point, O., have been able to keep their works running and are at this time erecting a large addition to their works to give them greater capacity on their "Savage Crown" brand and other high grade bricks of their manufacture. They report a steady increase in their orders for high grade brick, and are providing more capacity to take care of it satisfactorily to their trade.

THE iron and steel house of H. E. Collins & Son, of Pittsburg, has removed from the third to the seventh floor of the National Bank of Commerce Building.

THE COKE STRIKE UNDER WAY.

The threatened strike in the Connellsville coke region took place Monday, April 2, but what its extent is and what the effect will be upon consumers of Connellsville furnace and foundry cokes cannot be accurately stated at this writing. The strike was ordered at a convention of the United Mine Workers of the Connellsville region at Scottdale, Pa., Monday, March 26. A resolution was passed reciting that the wages paid in the coke region were not sufficient to maintain lives, that a conference had been refused by employers and that the rate of wages formulated by the workers should be enforced by a strike. None of the producing companies paid any attention to the demands of the men and the strike was the result. The scale was not made public, but a delegate to the convention made the statement that 90 cents per 100 bushels would be demanded for mining and an increase of 12 per cent. over the Frick scale of Feb. 1 on all other labor.

There was difference of opinion among the workers at their convention at Scottdale on Monday, April 2, after the strike had taken place. Some wanted a strike at all the works, others at the works not paying the Frick scale, while still others wanted to declare the strike off until the organization can be completed and the men will be better prepared for a battle. The strikers estimated that 10,000 men were in the strike. At the Hill Farm mine a mob of Huns drove the workmen away at the point of the revolver, and several houses were fired. The men of the Oliver works went out leaving 1500 tons of coke to burn up in the ovens, but this was drawn under the protection of deputies. W. J. Rainey, when 75 of his foreign workmen went out at Moyer at once put 75 Americans in their places. The Frick Coke Co.'s employes were loth to go out for the most part and it is not believed that any considerable number of them can be drawn into the strike, as their wages are a matter of agreement and they have always been paid promptly in cash. The Leisenring No. 1 plant was closed down because of the discharge of 16 men who participated in the strike meeting and the demand of the employes that they be reinstated.

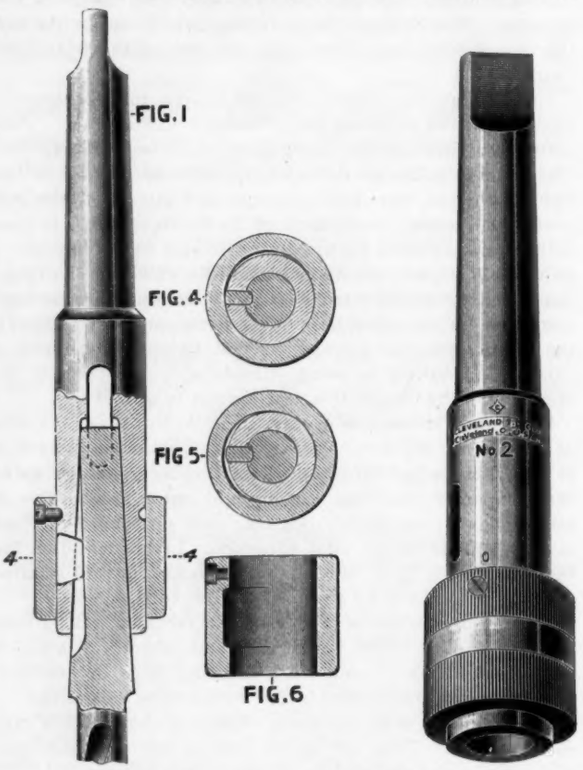
The production of Connellsville coke in the week preceding the strike was 113,921 tons, 11,341 ovens being active and 6,172 idle. This production was 3,180 tons in excess of that for the preceding week. Shipments fell off 20 cars, however, being 5,899 as against 5,919. The attempt of coke producers to force the output did not meet with favor from furnacemen and foundrymen; the latter, in spite of the fact that the price was the lowest ever known, were unwilling to place orders for more than present needs. Foundry coke has been selling down to $1 and furnace coke to 80 and 85 cents.

NEW METHOD OF DRIVING DRILLS.

Mechanics know that the weakest point about the ordinary taper shank twist drill is the flattened end of the shank, which frequently twists off long before the drill is worn out, or if it does not, it will often cut or ream out the flat recess in the socket. In either event the drill or the socket are forever after useless, until considerable expense has been put on them in the way of repairs. The Cleveland Twist Drill Co., have brought out what they call a grip socket that entirely overcomes this single weak point in the modern system of taper shanks. This grip socket is shown in the accompanying illustrations. A steel key is let into one side of the ordinary socket and its inner side engages in a groove or flattened place prepared for it on the shank of the drill. A slight turn of the eccentrically counterbored sleeve or collar locks the key securely in its seat, and then the drill cannot be turned in the socket or pulled out. This key is so located in the body of the socket that the tang on the drill will fit into the usual slot or recess prepared for it, and in this way the socket has a double driving power.

The advantages arising from the fact that the drill cannot be pulled out till the collar is turned back and the key released are many, as heavy tools have a provoking way of dropping out of their sockets at most inopportune times and many drills are dulled or spoiled by tapping them into place with a hammer. This simple drilling device being put directly on to the drilling machine spindle, heavy undercutting can be done with boring bars and the labor necessary to turn over heavy castings entirely avoided. These grip sockets will hold straight shank drills just as perfectly and securely and can be furnished with ½ inch, ⅝ inch, ¾ inch, ⅞ inch and 1 inch holes for straight shank drills. The company propose to put this necessary groove in the shanks of all of their drills so that they can be used in these grip sockets, just as the purchaser may prefer. A drill that has had the tang twisted off, can be made as good as new for use in this grip socket by milling a half round groove in the shank, or if it is not convenient to mill it, a flat piece can be filed or ground on the shank, care being taken that such groove or flat place has a taper the reverse of that on the out side of the shank, as shown in the section drawing of the illustration.

The small cut illustrates the reducer or shell sockets used with the "grip." The Cleveland Twist Drill Co. have applied the gripping device directly to several drill press spindles, and will furnish collars properly constructed for that purpose on application at a trifling expense. They have put in special machinery for making these "grips" and as all parts will be



made to jigs or standards they can furnish duplicate parts at any time. A patent has been applied for and all rights reserved by the Cleveland Twist Drill Co., Cleveland, O.

Publications Received.

The Lodge & Shipley Machine Tool Co., of Cincinnati, issue a very attractive pocket handbook of their machine tools for the rapid production of lathe work. Miniature cuts, accompanied by lucid descriptions of pulley lathes, drilling and tapping machine, turret lathes, triple facing machine, universal brass worker and horizontal and cylinder boring machine, occupy the major portion of the little book and following them are reproductions of commendatory letters from users of Lodge & Shipley machine tools.

The Jeffrey steel cable conveyors are the subject of special treatment in a new pamphlet published by the Jeffrey Mfg. Co., of Columbus, O. Full page illustrations show the various economies in handling products, that are made possible by the use of this apparatus, one of these representing the conveyor handling nut, slack and pea coal at coal tipple and another its application to coke and gas works in handling fine coal. The conveyor is made of the best crucible steel rope, 19 wires to the strand, with hemp center and the attachments are made of iron or steel to suit the class of work for which they are intended.

THE Edgar Thomson Steel Works at Braddock, after working on billets for two weeks resumed on rails April 2, and will run thus for several weeks.

MACHINE SHOP AND FOUNDRY.

WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular meeting of the Western Foundrymen's Association was held Wednesday evening, March 28, 1894, at 225 Dearborn street, Chicago.

The president, Mr. G. M. Sargent, being unable to attend on account of illness, Mr. C. M. Conradson was chosen temporary chairman. The following were present at the meeting: C. K. Pittman; P. Wittlinger, Wm. Deering & Co.; J. L. Hecht, Wm. Deering & Co.; Andrew Hawthorne, Mathew, Addy & Co.; W. Leahy, Wells & French; F. B. Whitcomb; J. S. Cary, Cary & Moore; H. T. Murray; J. E. Moore, Cary & Moore; W. D. Barton, Wells & French; C. M. Conradson, Gisholt Machine Co., Madison, Wis.; Martin Peyton, Fuller & Johnson, Madison, Wis.; H. L. Hotchkiss, Wm. Deering & Co.; A. T. Stantial, Illinois Malleable Iron Co.; Lewis L. Trowbridge, Wells & French; H. S. Vrooman, Garden City Sand Co.; E. C. Greenlee, Greenlee Foundry Co.; A. T. Whiting, Detroit Foundry Equipment Co.; Jno. H. Blood; B. M. Gardner, *The Iron Trade Review;* R. F. Palmer, *Industrial World.*

The minutes of the previous meeting were read and accepted. The report of the Treasurer was read, showing a balance on hand of $15.36.

The following were unanimously elected to membership in the Association: The King & Andrews Co., of Chicago; E. G. Richards, of the Berlin Machine Co., Beloit, Wis.; Gisholt Machine Co., Madison Wis.; C. K. Pittman, Chicago; and Wm. Deering & Co., Chicago.

The Secretary then read the following letter asking for information:

DOWAGIAC, MICH., March 27, 1894.

B. M. Gardner, Sec.

Dear Sir: I regret very much that I shall be unable to attend the meeting of the Western Foundrymen's Association the 28th inst. Will you please bring this matter before the meeting: We use a mixing ladle for our cupola. At the point of contact where the iron from the cupola spout strikes the body of iron in the mixing ladle, a shower of sparks is sometimes given off, or rather minute incandescent drops will fly up, sometimes ten feet high, and burst into sparks. I would like to know—and perhaps it would not be uninteresting to others—what causes this condition? Is it because some constituent of the iron is in excess of the true properties, and if so, what is that constituent? Yours very truly,

A. K. BECKWITH.

Mr. Stantial: My suggestion would be that in that case either air or water—or moisture—was carried into the ladle by the flame from the cupola, which might possibly cause sparks to fly from the body of the ladle.

Mr. Conradson: As I understand it, it is simply that sparks are thrown off.

Mr. Stantial: Well, I should say it was more mechanical than anything else. The same thing would be caused by a drop of water coming in contact with the iron.

Mr. Trowbridge, on being asked for an opinion, thought that the giving off of sparks was an indication that the mixture was harder at one time than another.

Mr. Conradson: I believe it is all stove work that they make at that foundry.

A paper on "Cupola Heat and Quality of Cast Iron," by Mr. W. J. Keep, was then read by the Secretary. [It appeared in the last issue of *The Iron Trade Review.*]

Mr. Moore, on being asked to start the discussion, said: "I wish to say for myself and Mr. Cary that we make no pretension to being metallurgists in any sense of the word. We are chemists pure and simple. If there is anything in that line in which we can be of any assistance, we shall be glad to do so."

Mr. Hotchkiss: Did you have borings?

Mr. Moore: We had samples that came from the first part of the heat and from the last of the heat. They were simply test bars. We had to bore pretty nearly all over them to get enough to work with. We only had two pieces about six inches long.

Mr. Conradson: I should like to ask if you are sure that you did not get some of the carbon in the steel of your drill that is worn off into your resulting borings?

Mr. Moore: The wear of the drill in boring enough for analysis would be so small that nobody could see it.

Mr. Conradson: Well, in some cases. Sometimes the iron is hard. I had a lot of chrome steel to test, two qualities of chrome steel. The Brooklyn chrome steel we could not drill, but we made a slight impression on the chrome lining. The ordinary chrome steel could be perforated, but we wore off ten times as much of the drill as we got from the steel.

Mr. Moore: Well, in a case like that the steel in the drill, of course, would influence the result. In ordinary work I do not think there would be the least practical danger. If you got a piece of the drill in it would influence your results, but not to any appreciable extent. The difference in percentage of carbon in a piece of drill, or piece of steel from a drill, and the carbon in the iron, is so small comparatively that if you even had a piece one-hundredth part or one-twentieth part of the total weight, it would not influence the results. And then another thing: We always run duplicates on our determinations, and if we got a piece of the drill in it would show immediately in our results, and it would require another determination to be run to see which of the two was right. The gradual wear of the drill would be distributed throughout the whole sample, and we would never find out at all, unless we noticed the wear of the drill. But a piece breaking off would be noticed immediately.

Mr. Hotchkiss: Mr. Keep says in his paper: "The difference in strength in this case is in no way occasioned by change in chemical composition, but is no doubt due to the internal strain in the first test bar (784) caused by a rigid shell forming about very hot metal." And it says: "The difference in strength is therefore due to physical structure."

Mr. Moore: The last samples that we analyzed, four samples, for sulphur and silicon, were exactly the same iron as the first two of which a full analysis is given on the first page.

Mr. Hotchkiss: Does that mean poured from the same ladle at the same time?

Mr. Moore: Mr. Keep wrote us that the iron is the same as the first two samples which we analyzed; he used the same iron in making up the mixture.

Mr. Hotchkiss: But he wouldn't know whether they were the same without an analysis, would he?

Mr. Moore: I shouldn't think so.

Mr. Vrooman: I think he contradicts himself. He says: "We shall prove that the difference is caused by the variation in heat at which the iron was melted; not the heat of the iron when it was put into the mould." Further on he says that iron gains strength by standing, and it says that when poured from the ladle after standing his test bars have shown more strength than when it was poured directly from the cupola.

So then it is not the heat that controls the difference in the breaking strain. It must certainly be in the composition, or the chemical action that takes place after the iron is put into the ladle, or after it stands.

Mr. Stantial: I don't think enough chemical determinations were made to determine what causes this. Mr. Keep has made partial analyses; the cause for it he may have omitted.

Mr. Vrooman: He tries to prove that it is not the way the iron is poured, but it is the way that it is melted, and afterwards shows that when it is poured cold it has a greater breaking strength than it has when it is poured hot. Now at our last meeting Mr. Beckwith said that he had tried that in all different forms, pouring hot and cold, and he could see no difference at the last end of the heat from the fore part; that it was not in the way the iron was poured.

Mr. Conradson: I should like to ask Mr. Moore to explain why it is that we can rely absolutely on these test bars; why it is that the unavoidable differences in moulds will not affect the test bars? For instance, supposing a test bar should be poured in a wet mould, would it give you just the same results as if poured in a dry mould? Does the position in which it is poured have anything to do with it? It seems to me that you would get a different test bar if you poured the same iron into a very wet mould from that poured into a very dry mould.

Mr. Vrooman: There is one thing that some of the foundries do that I think is a mistake, in making a test bar. They use one sand to mould with and then they buy fine sand, something like the Albany, and make their test bars in that. You

will get a better test bar by using finer sand, than in the sand used for ordinary work, because it has more silicon and less organic matter in it, and less impurities in it, and there is nothing there that would affect the iron. They should use the sand that they use regularly, in order to get accurate results.

Mr. Moore: I don't think there is anything in the mould, in the way of moisture or position, or anything of that sort, that could change the chemical composition of the test bar.

Mr. Conradson: I think it changes the relation of carbon, the proportion of combined carbon to the total carbon.

Mr. Moore: If you will take a good average sample of the bar, I don't think that will be appreciable.

Mr. Conradson: You can readily pour a half inch or one inch test bar in a mould so wet as to show white nearly through it.

Mr. Vrooman: Will the bar of very hard iron show a greater breaking strength than a soft one?

Mr. Moore: Yes.

Mr. Conradson: It shows a different chemical analysis.

Mr. Moore: In reference to the carbons combined and graphitic.

Mr. Conradson: That would be entirely changed in a two inch test bar.

Mr. Vrooman: I think so.

Mr. Conradson: Now, I have no doubt but that Mr. Keep has some definite means on which he relies as showing practically correct results.

Mr. Stantial: I believe he pours his bars under as nearly the same conditions as possible.

Mr. Conradson: Well, what those conditions are, we don't know.

Mr. Stantial: Well, as nearly alike as possible. In pouring, he uses the same sand and just about the same moisture in it.

Mr. Vrooman: Uses the same sand that he makes his casting in. He has a moulder right on the floor.

Mr. Stantial: Yes, I believe he has.

Mr. Witlinger: We make them in ordinary sand the same as we make our regular work. The same man makes them every day, using sand of the same grade.

Mr. Conradson: What is the size? Half inch square?

Mr. Witlinger: Yes.

Mr. Moore: Do you undertake to keep the conditions there the same right along?

Mr. Witlinger: Yes.

Mr. Greenlee: Is the atmosphere allowed to strike them in cooling on one side?

Mr. Witlinger: We always make them in a flask.

Mr. Gardner: Mr. Cary has just brought over the bars from which the analyses were made. No. 1 shows the first of the heat, and No. 4 the last of the heat. (The bars were handed round for inspection.)

Referring to the analyses, Mr. Cary said they were complete except as to aluminum.

Mr. Conradson: About how much aluminum is there in that?

Mr. Cary: That is a question that has to be determined by analysis. It might go pretty high. They use aluminum now in steel works; in making billets they use it to quiet the steel as they pour it. It will run anywhere from a hundredth to one per cent. The effect of aluminum on steel or iron is something that is not very considerable.

Mr. Conradson: I would like to ask how you make your tests, Mr. Hecht.

Mr. Hecht: It is done with Keep's machine. We measure the deflection and the shrinkage in chill, in the side of the bar.

Mr. Conradson: What determines whether a bar is good iron or poor iron?

Mr. Hecht: Well, of course the strength and hardness, shrinkage and so on, are all factors which are to be taken into consideration. It depends on the class of work you are after. But the idea is, as I understand it, to determine when you have got the shrinkage and chill and so on that you want.

Mr. Vrooman: Can you rely on the breaking strength to give you a fair idea of what the chemical composition of the iron is?

Mr. Hecht: Well, I think you can rely on the breaking strain to give you an idea of the condition of the carbon.

Mr. Vrooman: For instance, if you had two bars that broke at the same strength, could you according to your method say that those two would analyze the same?

Mr. Hecht: No, not at all. Silicon is an antidote for the undesirable elements that may behave in an opposite manner, and of course the amount of silicon there would be influenced by the amount of other things, sulphur and phosphorus, manganese, and so forth.

Mr. Vrooman: If two bars will break at the same weight, and their chemical composition is different, of what use then would be the chemical or the physical test? If you can't get a chemical analysis that will give you a uniform iron, or you can't get a physical test that will determine a uniform iron, of what use is either?

Mr. Hecht: The physical test I should say comes in to tell you what you have, and it is generally admitted that you can control the casting by the amount of silicon present. You can by means of chemical analysis tell how much silicon you are using, and the price of foundry iron I understand is largely dependent on the amount of silicon it contains.

Mr. Vrooman: Well, I don't know. If two bars were to break at the same strain, but would not give the same chemical analysis, I don't see then how you could compound a mixture of iron that would give you a sure result.

Mr. Hecht: If you had two bars breaking at the same weight and one had two per cent. silicon in it and the other had two and one-half per cent., I should say the one with two per cent. silicon was the better iron.

Mr. Stantial: Why?

Mr. Hecht: Why, simply because we have the desired strength and softness, with a minimum amount of silicon in it as compared to the other. As I understand, the amount of silicon in an iron regulates its price, to a certain extent.

Mr. Stantial: Not necessarily. Southern iron will sometimes carry more silicon than Northern iron, and the price usually is lower than the Northern iron.

Mr. Hecht: Well, on Southern irons, other things being equal, doesn't the cost of production regulate its price considerably?

Mr. Greenlee: Do we not find the element of silicon existing in the native ore before it enters the blast furnace at all?

Mr. Hecht: Certainly.

Mr. Greenlee: Then does the Southern ore contain more than the Hanging Rock ore?

Mr. Cary: The silicon does not exist in the original ore; it exists as silica, or silicon-dioxid.

Mr. Greenlee: This paper, as I understand it, establishes the theory that iron run very hot from the cupola gives an iron that runs high in silicon. Now, I understand from the beginning here that iron as it runs into the mould, or when it is cool, produces more silicon. If that is the case, I would like to have you put me right then as to what chemical action takes place between the manganese and the combined carbon that gives you more silicon when it is cool than it does when it is hot.

Mr. Cary: When it is cool, the idea is that when you drive out silicon you increase the combined carbon, if I understand it rightly.

Mr. Greenlee: Where do the sulphur and manganese come from?

Mr. Cary: Sulphur and manganese, as far as I have read on the subject and understand it, don't cut much of a figure with the carbon or the silicon. The silicon and carbon depend more on each other; are more relatively proportioned in the iron.

Mr. Greenlee: The practical point is, how can we obtain a soft, tough iron? That is what we are after. I wouldn't deprecate analysis; I always look upon that in a progressive way; but sometimes analysis seems to be more scientific than practical. The man that stands at a blacksmith forge sees the iron is just of the right temperature, and says: "Now, it will weld." When I walk into the foundry and see the iron running from the spout, and it presents that peculiar color, I say to myself, "the next casting tomorrow morning will be soft." But if it is of another shade I must look out for small castings to see whether they will not be brittle. Now, there is a practical test. And in laying the bed in the cupola I find that certain conditions of the atmosphere in putting the blast into the furnace will sometimrs give you a soft iron. Out of the same heat, may be, the next ladle following you

will have a hard iron, and then another one soft. I know that certain conditions of the atmosphere will give you better iron than you get at other times.

Mr. Cary: The conditions do not change in the cupola. You get a better draft in one case than you do in another. We find that in our assay. For instance, you take a dull, heavy day and you do not get nearly as good heat as on a sharp, bright day. And in our laboratory, where we have ventilation on a bright day, we don't have any ventilation on a dull day. The heat of the cupola depends to some extent on the atmosphere. On a sharp day, with a sharp wind and a clear, bright day, the atmosphere is light and you get a good draft; on a heavy, dull day, the draft is poor and the heat slow.

Mr. Conradson: If you have to force in the air, it doesn't make much difference about the draft.

Mr. Greenlee: I put mine in with a charge of twelve and a half pounds to the square inch—from that to thirteen pounds—and hold it there; I know what my blast is; I regulate it. I use a shaft that is running 300 revolutions a minute, with the other attachments, a governor on the engine, and I know I am going to get things pretty steady; I get that same blast and get the pressure the same on the cupola; I watch it. Now, does it make a difference whether I am forcing hot or cold air and running that through the cupola? Or whether when the drafts are all closed up, I am taking air that is partly heated, warm from the foundry room, and forcing that through?

Mr. Conradson: Certainly it does. You get less oxygen into the cupola per hour on a hot day that you do on a cold day. That is what we are after in the air, that is all we use it for—to get oxygen out of it. The more oxygen put in, the more rapid the combustion, and necessarily the hotter the fire.

Mr. Pitman: The temperature being equal.

Mr. Conradson: Yes. In fact, we had a case of that kind in our foundry several years ago. We put up a peaked roof to save room, and put the cupola in that peak. We started off melting first rate and about the middle of the heat the iron began to get cold. In about six months somebody happened to think that we were not getting pure air into the cupola; we were getting a mixture of foundry gases. So we put in a draft outside and cured it entirely. That shows that we had been shutting off our supply of oxygen to the cupola.

Mr. Greenlee: If there are any gases in the cupola it is best to get them out of that cupola just as quick as possible; and in the cupola that does not stand, say, over 25 or 30 feet high, would it give you better results than one standing 60 feet high, if it were possible?

Mr. Hotchkiss: Let me ask what result Mr. Keep is coming at in this paper. I believe it is generally understood that Mr. Keep claims that the result is governed entirely by the silicon. Here he states that the condition of the cupola also governs, in regard to the heat in there. And the conclusion he draws here, and in most of his papers, is that the chemist in the gray iron foundry is superfluous. It seems to me that if silicon governs the result, and you can tell by analysis the amount of silicon there is in the pig iron (which I suppose he would admit,) then I should say that the chemist was very useful to determine that. Mr. Keep claims that by the shrinkage and chill you can determine this, but that of course has to be done after the casting is made. Even if you make it at the beginning of the cast, before the test is made the cast would probably be half out. Your iron would be up anyway, so that you could make no change, and there would be one day's cast that you couldn't determine until after you were through casting. Now, then, if he could tell by chemical analysis, before he charged his cupola, just the amount of silicon that is in his iron, and he knew what he wanted, I should say that it was better to find out before he charged the cupola than after the heat was run out.

Mr. Witlinger: I don't agree with him in his first statement. He claims that the cupola is not hot; he claims the first charges in the cupola will be less hot than any other charge in it. You have your full bed there, perfectly clean, no dirt in it. After it melts a couple of hours it gets clogged up with dirt. Your first charge would go through quite a fierce heat. After it gets clogged up with dirt it don't go through this heat. I claim the first charge of iron gets more heat than any other charge in the cupola. You have a bigger bed to shove it through.

Mr. Greenlee: And combustion will make some headway by that time.

Mr. Barton: I should like to ask what he is trying to get at here—if he means that he can get a stronger iron out of a cold iron than he can out of iron that is hot. Is that what he means here by speaking of letting the iron stand in the ladle?

Mr. Vrooman: That is what he claims.

Mr. Barton: I have taken test bars and poured them in the first part of the heat, as hot as I could get them out of the ladle, and then poured a test bar from the latter part of the same iron after letting the iron stand in the ladle, and the hot iron bars stood 700 pounds more than the cold. They were inch square bars, 12 inches long.

Mr. Cary: What is the exact meaning of a strong iron? Is it an iron that will stand a great deal of strain?

Mr. Conradson: It is one of high tensile strength.

Mr. Vrooman: What causes, in remelting iron, make the iron harder?

Mr. Hecht: I should think it is probably because of the loss of silicon, which means increase in combined carbon.

Mr. Stantial: Increase of sulphur.

Mr. Hotchkiss: Mr. Keep says sulphur has nothing to do with it.

Mr. Vrooman: The gates will ruin the mixture, in remelting the gates over a certain length of time without changing it.

Mr. Hecht: I don't know about that from experience, but I should say that every time you use the gates, of course, it means simply remelting iron, and if you lose silicon every time it will get worse and worse.

Mr. Vrooman: Annealing cast iron will bring it back again to its original softness. If a gate is fastened to a large casting, by the time the casting is cool the gate will be perfectly annealed. Does the annealing restore the silicon to the iron?

Mr. Hecht: Oh, I should say in annealing iron the cooling process is generally a comparatively slow one, and that would be productive of graphitic carbon, the same as silicon would under other conditions, and of course it produces softness in that way.

Mr. Vrooman: Do you believe that remelting does cause the iron to get hard?

Mr. Stantial: I have known a case where remelting has made it softer. I can't explain the reason for it; I didn't go into it deeply enough. But I had pig iron at one time that carried about two and a half per cent. manganese, and you couldn't put the hardest drill into it. In melting this pig in the crucible I found that you could drill it; it was very soft indeed after melting. I made a determination of the manganese; I didn't make a determination of the other elements—simply the manganese; I found the manganese practically the same. But the casting was as soft as any soft gray iron casting.

Mr. Pitman: What was the character of the iron after being remelted?

Mr. Stantial: It had the appearance of good iron. It also had the appearance of good open iron in the pig.

Mr. Barton: You say the test was softer than the iron?

Mr. Stantial: The pig iron carrying the two and a half per cent. manganese could not be touched with a drill.

Mr. Barton: Was it melted in a cupola?

Mr. Stantial: In a crucible.

Mr. Barton: Both tests?

Mr. Stantial: I melted the pig in the crucible. I broke the pig into small pieces. When I poured it, expecting to find a casting as hard as the pig, to my surprise it was as soft as any piece of gray iron casting.

Mr. Barton: The crucible has a different effect from a cupola.

Mr. Stantial: Certainly. You can depend on no impurities being there.

Mr. Greenlee: My impression is that people use more sand than there is any need of. I found that demonstrated when I needed sand once and couldn't get it. And I have not used as much sand since. It may not suit the sand men quite as well, but it suits me all right.

Mr. Vrooman: Of course new sand is only used for the strength you get from it. It is not the amount of sand you are after, because we have always plenty of sand and have to wheel some of it out; but it is to give or to help the strength.

Of course new sand will lose weight in the burning, which shows that it contains a certain amount of matter that is no good, and until you get down to the actual silica that the sand contains, it will keep on losing weight. I claim that we have to go further than the coke or the iron, if we get down to analyzing your product.

Mr. Pitman: There is one point I have thought of. From the time the fire is started and the iron put in the cupola to the time the first casting is taken out of the mould, there are various things that affect the quality of the casting. I have no doubt that in the aggregate they will amount to a good deal, although I believe that the main trouble is in the cupola rather than in any impurities that are introduced in the iron after the metal is drawn out of the cupola. I think the cupola is really the vital point.

Mr. Vrooman: I don't dispute that at all, but often in the same heat don't you have one casting that will break easier than another, perhaps from the same ladle of iron?

Mr. Leahy: I would wish to say this about the effect of lime on cast iron. We used it in my factory for the last four years, in making cores, and I have tested it. I have taken iron from the same cast; have washed the core with plumbago and also with lime, and I found that the casting with lime in it was considerably softer than the one without. But I have found from experience that lime in the cupola had a tendency to harden the iron, and I don't know how it was brought about.

Mr. Pitman: I am inclined to think that lime, when it hardens the iron, acts more in the way of taking some substance out of the iron by chemical combination, rather than acting upon the iron directly. For instance, one process of purifying iron that is being discussed now and experimented with is based upon the very idea of putting some of the carbonates in the molten iron in order to reduce the impurities and leave the iron free; and if I understand it right, there is some reasonable hope of success from that process.

Mr. Leahy: I thought at first, when I commenced using lime, that I could rely on my own judgment; but I have since taken castings to the machine shop to be finished and the machinist positively declared that the casting with the lime in it was considerably softer than the one without. And I have found a number of times, also, that the presence of lime in a mold has a tendency to make the casting porous. I have tried cores with cold wash, without any wash at all, and with lime wash, all taken from the same heat, and I didn't see any difference whatever. In fact, I must say that the casting with the lime in it was the best appearing casting of all.

Mr. Conradson: Will you explain just how those cores are made?

Mr. Leahy: Well, the cores are made in the ordinary manner; you mix so much sand with so much flour and bake it in the oven; you take them out pretty hot, put them in a tub with slack lime in it, and the heat of the core itself will dry it. It will leave a nice thick wash. Of course the thickness of the coating of lime on the core can be regulated by the thickness of the fluid. But too much limestone in a cupola I have always found will harden the iron every time. When the cupola gets a little stronger sometimes than at others, gets a little too much, I can tell the difference right away.

Mr. Conradson: What is the consistsncy of the lime in the vats that you use?

Mr. Leahy: About what would be applied on a wall.

Mr. Witlinger: You have had some experience Mr. Stantial, with lime hardening the iron. You don't find any difference, do you?

Mr. Stantial: I never found anything of that kind.

Mr. Greenlee: I would like to ask Mr. Leahy the size of his heat in which he found the lime deleterious to his casting; when he slacked the furnaces and found that trouble what was the size of his heat that he took off?

Mr. Leahy: They vary from 50 to 25 tons.

Mr. Greenlee: Could you give us an estimate of about the number of pounds you used to heat the slag, the heat?

Mr. Leahy: The heat I couldn't estimate by weight; I have never weighed it. But I can give you the amount of limestone in it; we use it as a flux. It is very good for the furnace when handled with care; frees the iron from all dirt and deleterious substances; but where it is overdone it has just the opposite effect.

Mr. Conradson: About what percentage of lime do you use?

Mr. Leahy: About one to fifty.

Mr. Whiting: Mr. Chairman, I move that the Association tender a vote of thanks to Mr. Keep for his very interesting paper, and to Messrs. Cary and Moore for their analyses, and the kind attention which we received from them this evening. The motion was seconded and unanimously carried.

Mr. Pitman: I would make a suggestson. There seems to have developed some opposition and some want of understanding of the meaning of this paper. It is pretty hard to digest a paper of this kind at the first reading. I would like to suggest that it might be advisable to continue with this question after we have had the opportunity to consider it more carefully, at the next meeting.

Mr. Gardner: Before we adjourn I would like to tell the members, and the gentlemen present who are not members, that the Secretary will be very glad to receive from foundrymen any questions they may have to submit to the Association for discussion. However short and unimportant they may seem at the time, they are quite apt to raise a very interesting discussion, and if anything comes up in your practice that is not fully understood I should be very much obliged if you would drop me a line explaining as fully as possible all the circumstances in the case, in order that I may read it at the next meeting and have the question discussed.

Mr. Conradson: Would it not be well also, if we can arrange it, to send these questions out, so that the members can come fully primed?

Mr. Gardner: Yes, if the questions are presented to me in time I will get them in print before the meeting, so that they can be studied over before the meeting takes place. And as I said, I shall be very glad, indeed, if the members and other foundrymen will take advantage of this suggestion.

The meeting then adjourned.

CHEMISTRY IN THE FOUNDRY.

We have received the following additional responses to our inquiries, noted last week, concerning the experience of well known foundry firms in the employment of chemical analyses as a guide in their work:

INDUSTRIAL WORKS, BAY CITY, MICH.

Our foundry business has not approached such dimensions as to warrant the services of a chemist, and our tests as to the quality of castings we produce and the irons which enter into their composition have been largely of a physical nature. We believe this class of tests efficiently and regularly made are productive of good results, and all that a majority of foundries really need or can afford. There are likely exceptions where the nature of the work requires the constant attention of the chemist both in the way of materials used and castings produced. With the ordinary work of a medium capacity foundry, should the services of a chemist be desired occasionally, they can usually be procured at moderate expense. In the process of reducing expense we have known several companies possessed of complete laboratories to cut these off among the first. Yours truly, C. R. WELLS, Secretary.

GLOBE IRON WORKS CO., CLEVELAND.

Your letter of the 21st inst. has been received and we reply:

First: While we do not employ a chemist in our foundry, we cannot see why it would not pay to keep one regularly employed to conduct all physical and analytical tests, thus arriving at the closest data possible, provided it would result in more uniformity in the cast metal, a maximum in tensile strength and a minimum cost of stock and output.

Second: We have never had analyses made of the stock or of the direct results from a given stock, depending largely on the machining of the surface, observing fractured surfaces, noting freedom from blow-holes, etc. More recently we have had a series of physical tests, which have been of value in determining the quality of varying mixtures.

Third: We buy our stock from best known brands of pig metal, and have had a uniformly excellent grade of castings (which are largely for heavy marine machinery) as the result.

Very truly yours, LUTHER ALLEN, Secretary.

VULCAN FOUNDRY AND MACHINE WORKS, PITTSBURG.

We do not buy pig iron strictly on chemical analyses, nevertheless we like to know the analyses of the irons that we use.

Some makers give us the analyses and others we get by inquiry. The probability is that if you would attempt to make castings strictly by analysis you could not get two casts alike any more than you get by selecting brands of irons for your mix, from which you are satisfied you got the best results from. However, our experience shows that you cannot get two casts alike. We attribute this to the condition of atmosphere and blast by the fan. We therefore at present do not think that it would be any advantage to us to employ a chemist. We do not have any requirements to furnish chemical tests of castings. We do in some cases have to furnish physical tests. Yours very truly, STERRIT & THOMAS,

D. J. THOMAS.

CAN'T JUDGE FOUNDRY IRON BY ITS CRYSTAL.

The Valentine Iron Co., of Bellefonte, Pa., in No. 2 of the occasional address they issue to the trade, which they have named *Nittany Bulletin*, make some interesting comments on a subject often referred to in these columns, and that the two foundrymen's associations have made a very live one. We quote as follows:

"We have, by careful experiments, determined that little reliance is to be placed on judging foundry iron by its crystal. We rely, ship and sell on chemical analysis. We have in our laboratory samples of irons which gave trouble to our patrons, and which we analyzed for them to ascertain the cause of the difficulty. Some of these showed crystals as large as we have ever seen in any iron, and yet on analysis they proved to be the hardest of forge iron, having scarcely one per cent. of silicon. On the other hand we have made and used in the cupola our own iron without any crystal, close in grain, having 4½ per cent. silicon and secured as fine castings as any one could desire. In view of this, we have determined to sell our foundry irons on analysis, which we have found always reliable, rather than on fracture, which is frequently misleading.

"In former issues we have alluded to tests made by us of irons which gave difficulty to foundrymen. All of the bad irons showed right on fracture; but our chemical analysis revealed the flaw, and in every instance we have succeeded, by relying on chemistry, in helping our patrons to use up the condemned or bad irons. In the annexed table we show in the first column what the analysis of a good foundry iron should be; in the other columns some of the troublesome irons furnished us:

GOOD.		Bad No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
3.00 %	Silicon	1.95	2.14	0.93	1.41	1.15
0.50	Phosphorus	0.67	0.28	0.28	0.62	0.25
0.06	Sulphur	0.02	0.02	0.06	0.02	0.04
3.10	Graph. Carbon	3.77	4.30	3.57	3.25	3.38
0.60	Combined "	0.48	2.17	1.32	0.38	1.03
0.50	Manganese	1.07	0.47	0.49	0.72	3.35

"The difficulty nearly always is due to the improper proportions of one of the above elements—especially can hardness be traced to the silicon, sulphur or combined carbon; and occasional difficulties also to excessive phosphorus, manganese and graphitic carbon."

MR. C. M. CONRADSON, of the Gisholt Machine Co., Madison, Wis., manufacturers of turret lathes, called at the Chicago office of *The Iron Trade Review* last week. Mr. Conradson said that his company had been doing a very good business lately, and that while they had received no large orders for machines, the number of small orders coming in all the time is sufficient to keep them busy. The company have recently received orders from Germany and Austria for 15 of their machines. The works of the Gisholt Machine Co. have been enlarged considerably of late and several new tools have been added. It is expected that further improvements and additions will be made in the near future.

THE heaviest shearing machine ever made has just been completed at the Park Grove Iron Works, Glasgow. It is intended for shearing iron and steel plates up to two inches in thickness and six feet six inches in width. The tool weighs 112 tons, and is driven by two engines with cylinders 20 by 24 inches. It will be used in the new works of the Glasgow Iron & Steel Co.

INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trades:

Ellwood City, Pa.—Ellwood Tin Plate Co.; capital, $10,000; for the manufacture of iron or steel or both, etc.; incorporators: Robert C. Aiken, A. H. Aiken, J. E. Aiken. Address letters care of D. B. & L. T. Kurtz, New Castle, Pa.

Normal, Ill.—The Patrons National Mfg. Co.; capital, $100,000; to conduct a general manufacturing business; incorporators: Joshua Green, J. E. Willson, D. Q. Trotter, J. F. Randolph, T. J. Crowder. Address letters care of T. J. Crowder, Normal, Ill.

Lebanon, Pa.—Central Stove Works of Lebanon, Pennsylvania; capital, $30,000; for engaging in the manufacture of heaters and ranges and miscellaneous castings; incorporators: Brooke S. Forster, Levi T. Schools, Richard G. Stanley. Address letters care of J. E. Reinochl, Lebanon, Pa.

New York City, N. Y.—The Raffloer-Schott Braiding Machine Co.; capital, $100,000; for manufacturing braiding machines; incorporators: Louis Raffloer, Rudolf Erosloh, C. H. Schott, 364 Broadway, New York City. Address letters care of Geo. Carlton Comstock, 59 Liberty st., New York City.

Saginaw, Mich.—Fairchild Fire Escape Co. of Saginaw, Mich.; capital, $30,000; for manufacturing patent fire escapes, after patent No. 502,070; incorporators: T. J. Fairchild, Jas. J. Wall, Thos. Nickels, Thos. P. Whittier, Saginaw, Mich. Address letters care of Weadock & Purcell, Saginaw, E. S., Mich.

Cleveland, O.—The Woltman Carriage & Wagon Co.; capital, $50,000; for manufacturing and dealing in carriages, wagons, harnesses and horsemen's supplies; incorporators: Wm. Woltman, Frederick Harrington, James H. Taylor, Harry J. Stockhaus, C. M. Woltman. Address letters care of Smith & Blake, Cleveland, O.

Brooklyn, N. Y.—The Mercantile Laundry Construction Co.; capital, $80,000; for manufacturing laundry machinery and supplies; incorporators: F. C. Wendell, 218 Pearl st., F. E. Evans, 218 Pearl st., Chas. Wendell, 29 Willow st., Brooklyn, N. Y. Address letters care of F. C. Wendell, 218 Pearl st., Brooklyn, N. Y.

Columbus, O.—The Coates Mfg. Co.; capital, $2,000; for manufacturing and selling recuperating oil burning machines, oil burners, heating furnaces, oil tanks, etc.; incorporators: John F. Coates, Edw. T. Bingham, Thos. E. Knauss, W. Y. Miles, John Cummings. Address letters care of Jno. Cummings, Columbus, O.

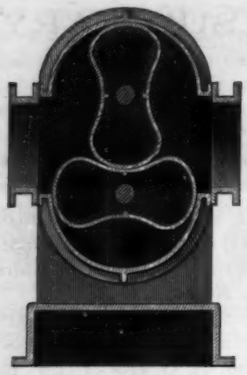
Peekskill, N. Y.—The Stove Mfrs.' Repair Association; capital, $12,550; for manufacturing stove castings; incorporators: H. T. Richardson, 23 Monroe Place, Brooklyn, N. Y.; H. E. Janes, 230 Water st., D. S. Ramsay, 247 Water st., both of New York City. Address letters care of H. M. Hitchings, 132 Nassua st., New York City.

Kent, O.—The H. P. Tool Co.; capital, $10,000; for manufacturing, dealing in, leasing, selling, establishing, etc., electric light and power plants, dynamos, motors, electrical goods, etc.; incorporators: W. S. Kent, J. W. Hawkins, E. N. Barber, Edward Snyder, M. M. Zellers. Address letters care of W. S. Kent, Kent, O.

Pittsburg, Pa.—Lincoln Foundry & Machine Co.; capital, $100,000; for the manufacture of iron or steel or both or of any other metal or of any article of commerce from wood or metal or both; incorporators, Otis H. Childs, James Kirkwood, W. F. McCook. Address letters care of W. F. McCook, St. Nicholas bldg., Pittsburg, Pa.

East St. Louis, Ill.—The Tracy Gas Stove & Furnace Mfg. Co.; capital, $50,000; for the manufacture and sale of gas stoves and furnaces, to buy and sell patents and territorial rights to make and use the same; incorporators: L. J. Tracy, Theo. Albes, Chas. M. Elam. Address letters care of T. J. Christy, 3632 Cote Brilliant ave., St. Louis, Mo.

Cleveland, O.—The Ohio Novelty Mfg. & Stamping Co.; capital, $25,000; for manufacturing and selling novelties and household goods of all kinds, stamping and pressing sheet metal goods, etc.; incorporators: F. E. Dellenbaugh, Wm. Schoellkopf, Christopher Albrect, Frank Huber, K. M. Brune



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Chicago, Ill.—Heimann Carbon & Insulator Co.; capital, $500,000; for the making of longlife carbons for arc lamps and of insulating compound, insulators and insulated articles of all kinds under certain U. S. patents, and for other purposes in connection therewith; incorporators: Solomon Heimann, Wm. Henry Osborne, August E. Gans. Address letters care of August E. Gans, 1128 Unity Bldg., Chicago, Ill.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

Box 303, *Iron Trade Review*, 1141 Monadnock Block, Chicago, is in the market for one 32″ drill press, one shaper of machine size, an engine lathe 8 or 12 feet, two small drill presses, and one 150 h. p. automatic engine. All of the above must be second-hand and in first class condition.

New Construction:—

McMillin Brothers, Kent ave. and Rutledge st., Brooklyn, N. Y., will erect a brick foundry, 40x100 feet.

Ground has been broken for the new 28-inch blooming mill at the Homestead plant of the Carnegie Steel Co.

The Belle City Malleable Iron Co., of Racine, Wis., will rebuild their factory destroyed by fire a short time since.

The United States Projectile Co., of Brooklyn, N. Y., will erect a brick machine shop, 99x102 feet in size, to cost $8,500.

The contract for roofing the new plant of the Garland Chain Co., at Rankin, Pa., has been given to the Penn Bridge Co., of Beaver Falls, Pa.

The National Car Wheel Co., of Buffalo, N. Y., has let the contract for two brick buildings, one being 40x90 feet and the other 16x30. These will double the capacity of the plant.

The Twin City Iron Works, of Minneapolis, will build a large machine shop in connection with their plant at Fourth st. and Twelfth ave., south. The building will be iron clad and will cost $10,000.

The Peck, Stow & Wilcox Co., of Southington, Conn., are about completing a gray iron foundry of large dimensions, and hope to have it ready to start up when there is a more pronounced revival of business.

At West Superior, Wis., the contract for the new dock of the Lehigh Valley Coal Co., was let to the Dodge Coal Storage Co., of Chicago. It will be of iron and steel and will be one of the most complete docks at the head of the lake, having a capacity of 175,000 tons.

The Janson Iron Co. is erecting a new rolling mill at Columbia, Pa., which is expected to be put in operation soon. The plant will be equipped with two heating furnaces and two trains of rolls, 1 12″ and 1 18″. The annual capacity will be about 6,000 tons of bar iron and steel.

The Mannville Covering Co., of Milwaukee, Wis., have laid the foundation for their new plant. It will be 150x50 feet and six stories high. Two new boilers of 100 horse-power capacity each, one 150 horse-power engine, one elevator and shafting will be put in, together with other machinery for the manufacture of pipe and boiler coverings.

Additions, Enlargements, Removals, Etc.:—

The Canonsburg (Pa.) Iron & Steel Co. are erecting a 75x100 foot addition to their plant.

Buckeye Mfg. Co., Union City, Ind., have make arrangements to remove to Anderson, Ind. They have been given a bonus equivalent to $22,000 in cash and a free gas franchise.

The American Aluminum Co., Kirkwood, Mo., whose plant is completed and ready for operation, expect to put up a 40-foot addition to the main building. There is a main building 120x60 feet and a smaller one 40x60 feet.

The Ingersoll-Sergeant Drill Co., whose plant was removed to Easton, Pa., from New York, has decided to erect another brick building 160x100 feet, to be used for machine work. This will give employment to about 100 additional men.

Negotiations have been finally closed, for the removal of the shops of the Louisville, New Albany & Chicago railway to Lafayette, Ind. The citizens pledge the payment of $150,000 bonds in consideration of the establishment of the shops.

It is reported from Tacoma, Wash., that the rolling mill of the Holcomb-Brown Iron Co., Burlington, Ia., will be removed to Tacoma, a bonus of $35,000 and expenses of removal being paid the company. About 400 men are employed. The plant had been idle for eight months.

Fires and Accidents:—

The plant of the Century Bicycle Mfg. Co., at Indianapolis, Ind., burned March 27. Loss is $60,000.

The machine shop of the Columbus, Sandusky & Hocking Railway at Columbus, O., was destroyed by fire March 27.

General Industrial Notes:—

The Bellefonte (Pa.) Furnace Co. put their furnace in blast at the beginning of the week.

The largest ingot ever cast at Homestead was turned out last week and weighed 175,000 pounds.

The Sioux City Ia., Engine and Iron Works resumed with a force of 200 men after a shut-down of nine months.

The Smead Foundry Co., of Toledo, deny the report that they have closed down and are freshly embarrassed.

The Duquesne Forge Co., whose plant shut down last Summer, and remained closed until recently, are now employing 80 men.

It is reported that for the present only three of the plants included in the new American Steel Casting Co. will be kept in operation.

At Ironton, O., the Belfont and Kelly nail mills are both running full. At the Eagle rolling mill the finishing department is operated single turn every day and the forge double turn three or four days a week.

MOUNT SAVAGE FIRE BRICK.

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Proprietors of the CELEBRATED Mount Savage Fire Brick.

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And all purposes for which Fire Brick are used. A Specialty made of High Grade Fire Brick. All Shapes.

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The American Fire Brick & Clay Co.,

MINERAL POINT, OHIO.

When you write to firms advertised in our columns, please mention the fact that you took their address from our paper. They will thank you for it.

The Farrel Foundry & Machine Co., of Ansonia, Conn., find some improvement in business and expect to run 10 hours a day hereafter.

The Beaver Falls plant of the Carnegie Steel Co., which turns out wire nails and wire rods, is active again after a shut-down of a few weeks.

Efforts are being made at Grand Rapids, Mich., to organize a stock company with a capital of $50,000 for the manufacture of machinery and special appliances.

At the Rod Mill of the Braddock Wire Works, located at Rankin, all previous records for turning out rods was broken last week. The record of 254,000 pounds in 12 hours was exceeded by 6,000 pounds.

Patch & Swift, the well known founders of Streator, Ill., have dissolved. The general foundry and machine business will be carried on by S. B. Patch and the stove repair business will be carried on by George Swift.

Wm. B. Turner, proprietor of the Bellevue Foundry, Schenectady, N. Y., will begin operation at his new plant on April 15, with a large force of workmen. A number of good sized orders have been placed on the books.

A company of Chicago, Pittsburg and English capitalists is said to have located a plant with a capital stock of $100,000 at Frankton, Ind., for the manufacture of steel supplies. The company will be known as the Indiana Steel Co.

The Gould Coupler Co. are reported to have purchased the works of the Anderson Steel Co., at Anderson, Ind. A new company, to be known as the Gould Steel Co., has been organized to assume control and to operate the plant.

The Bickford Drill Co., Cincinnati, recently received an order from Lafayette, Ind., for one of their six-foot boring mills. They report the current volume of business to be quite as good as they could hope for under the continued uncertainty.

The United States Iron Works Co., of New York, have purchased a foundry and property on the water front in Brooklyn. They have arranged to place the contract for tools for the mauufacture of their improved railroad frogs, switches, crossings and track tools.

The Garden City Sand Co., 1010 Security Bldg., Chicago, have recently furnished to Fred S. Benjamin, Reed City, Mich., a complete foundry equipment, including cupola, crane, ladles and tools of all kinds. The Garden City Sand Co. say that while business is still a little slow with them, it is improving all the time, and they are getting their share of the trade going.

Varnish makers are taking an interest in sand-papering machines and are advocating the use of them. A perfect surface on wood is absolutely required so as to get the best varnish effect. Several large concerns have instructed their traveling men to urge the adoption of the "New Conqueror" sander made by J. A. Fay & Co., of Cincinnati, on the ground that a good surface gives varnish a better reputation for quality and durability.

The Detrick & Harvey Machine Co., of Baltimore, have recently purchased from the Capitol Mfg. Co., of Chicago, their business of manufacturing the well known Adams bolt threading and Cook nut tapping machines. The reputation of these machines for accuracy and durability is well established, and it is unnecessary to go into details. The Detrick & Harvey Machine Co. have an excellent plant, and with the increased facilities of special machinery, they are prepared to turn out machines of the highest grade of workmanship.

The firm of William Jessop & Sons, Ltd., Sheffield, Eng., with American headquarters at 91 John st., N. Y., have prepared a complete and interesting collection of cast steel fractures, using the Jessop tool steel, for presentation to the Michigan Mining School, the State school of mining engineering at Houghton. The exhibit is intended for the benefit of the students and will prove a valuable acquisition to the equipment of the school. It is enclosed in an attractive cabinet. The Jessop steel is very generally used in mining, in the manufacture of drills and for all tool making purposes.

The sheriff has taken charge of the place of business of the Sterling Emery Wheel Co., at No. 174 Fulton st., New York, on attachments for $15,027, of which $12,029 is in favor of J. Murat Hirsch on notes given to the Hampden Emery & Corundum Co., and for merchandise and $3,000 in favor of the Commercial Bank of Hammond, Ind. At first the company, which was incorporated in 1887, manufactured all its goods at West Sterling, Mass., but in 1890 it built another factory at Tiffin, O. It is said the company had a large stock on hand, but owing to the shut-down among consumers this could not be sold. Liabilities are put at $30,000 and nominal assets at $75,000.

WAR rates to California and the Pacific Coast. Ask agents of the Nickel Plate Road.

NOW is your time to go to the Pacific Coast. War rates via the Nickel Plate Road.

DAWSON & GOODWIN, dealers in machine tools and machinists' supplies, at 57 S. Canal st., Chicago, have secured the Chicago sales agency for the Foos gas and gasoline engine, manufactured by the Foos Gas Engine Co., of Springfield, O. Messrs. Dawson & Goodwin have one of the Foos gasoline engines running in their store, and are very much pleased with the work it does.

PATRONIZE the through car service via the Nickel Plate Road to Chicago, New York and Boston.

Stahl und Eisen says that experiments have been made by a Frenchman, M. Japy, on the substitution of aluminum for iron for shoeing horses. The aluminum shoe is four times lighter than the iron one, and the horses after having been shod with them feel as if they were bare-hoofed. A good aluminum horseshoe will last from 40 to 60 days. The aluminum alloys used by M. Japy consist of: (1) pure aluminum, (2) 85 per cent. aluminum and 15 per cent. zinc, (3) 94 per cent. aluminum and 60 per cent. copper, (4) 90 per cent. aluminum and 10 per cent. German silver.

BUFFET sleeping cars are used in the through service over the Nickel Plate Road between Chicago, New York and Boston

THE people along the Nickel Plate Road have the advantage of through sleeping car to California points.

California.

Now is the time to visit the "Land of Sunshine." Low rates via the Nickle Plate Road to the Pacific Coast.

Scribner's Magazine for April opens with the second of Octave Thanet's sketches of American Types, suggested by her observations among the State buildings during the World's Fair. In this article she describes "The Farmer in the South." A very different type of character is described by H. C. Bunner in his "Bowery and Bohemia." Mr. Bunner describes "the real Bohemian," who is very little known and imperfectly understood by the general public. Gustav Kobbé, in "Life Under Water," gives the amusing and stirring adventures of a diver as related to him by a veteran. The illustrations throughout the number are particularly attractive.

THE Weeks Gas Engine Co., of Lake Geneva, Wis., recently incorporated for the manufacture of gas and gasoline engines, are already making engines and have orders ahead. Their needs in the direction of equipment and supplies are belting, files, machine shop supplies, paint and fillers, pump cylinders, twist dirlls, taps and dies, gasoline valves, tanks, burners, oil and grease cups, bearing metals, electric batteries and spark coils. H. E. Haskins is president and treasurer.

THE through sleeping car to California is now running reglarly. Talk to agents of the Nickel Plate Road about it.

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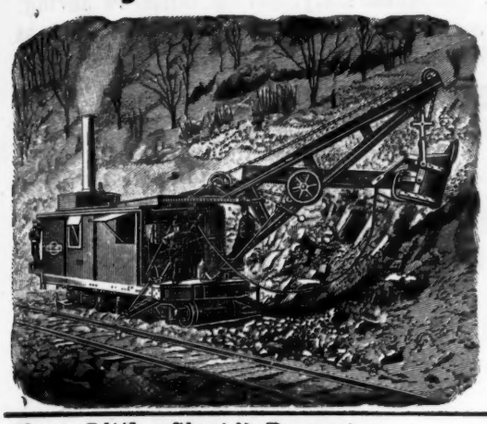

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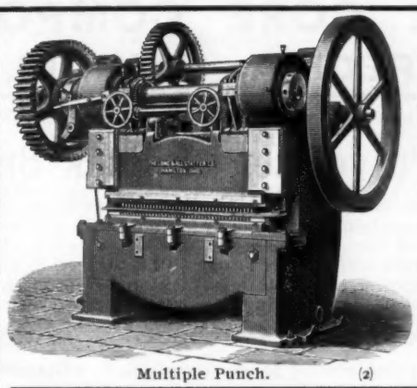

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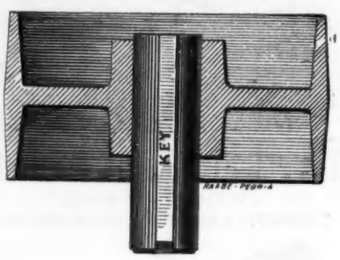

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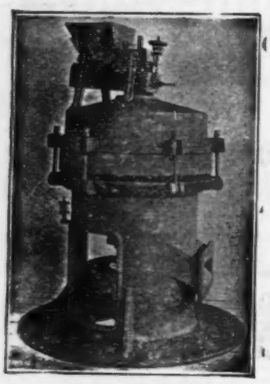

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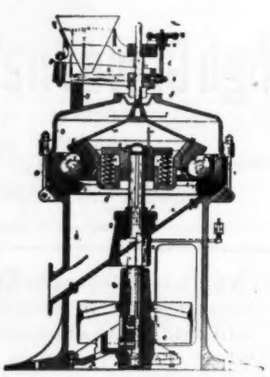

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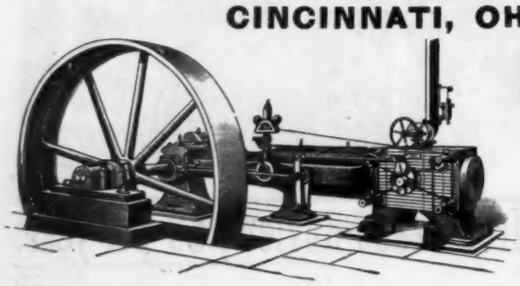

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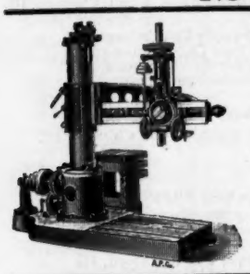

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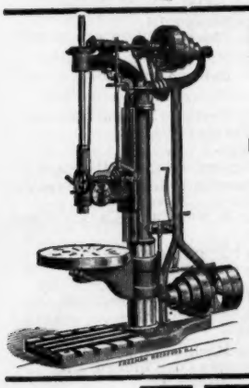

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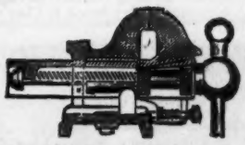

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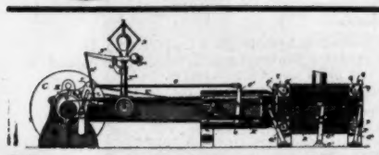

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Wooster and Garrett	†3:00 P M	†11:00 A M
Wooster		*6:30 P M
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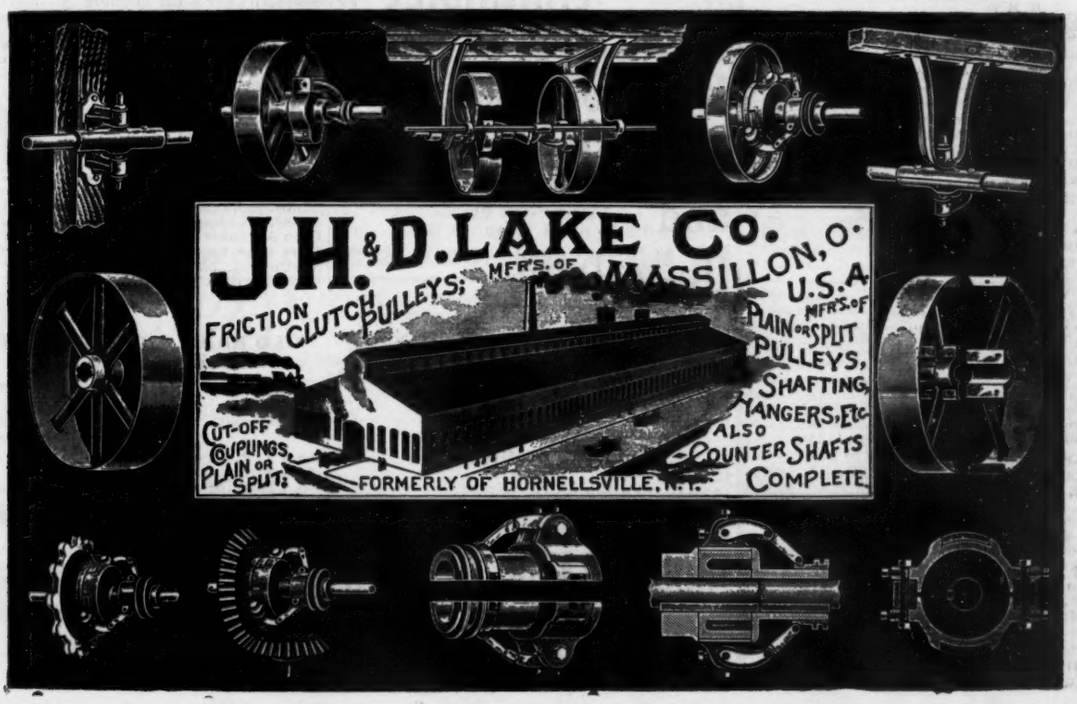

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The name of the Chicago, Milwaukee & St. Paul Railway has long been indentified with practical measures for the general upbuilding of its territory and the promotion of its commerce, hence manufacturers have an assurance that they will find themselves at home on the company's lines.

The Chicago, Milwaukee & St. Paul Railway Company owns and operates 6,150 miles (9,900 kilometers) of railway, exclusive of second track, connecting track or sidings. The eight States traversed by the lines of the company, Illinois, Wisconsin, Northern Michigan, Iowa, Missouri, Minnesota, South Dakota, and North Dakota, possess, in addition to the advantages of raw materials' and proximity to markets, that which is the prime factor in the industrial success of a territory—a people who form one live and thriving community of business men, in whose midst it is safe and profitable to settle. Many towns on the line are prepared to treat very favorably with manufacturers who would locate in their vicinity.

Mines of coal, iron, copper, lead and zinc, forests of soft and hard wood, quarries, clays of all kinds, tan-bark, flax and other raw materials exist in its territory in addition to the vast agricultural resources.

A number of new factories have been induced to locate—largely through the instrumentality of this company—at towns on its lines. The central position of the States traversed by the Chicago, Milwaukee & St. Paul Railway, makes it possible to command all the markets of the United States. The trend of manufacturing is Westward. Nothing should be permitted to delay enterprising manufacturers from investigating. Confidential inquiries are treated as such. The information furnished a particular industry is reliable.

Address **LUIS JACKSON,**
Industrial Commissioner, C., M. & St. P. R'y.,
160 Adams St., CHICAGO, ILL.

"5,000 AMERICAN FOUNDRIES."

Most Complete, Accurate and Up-to-Date

DIRECTORY of the FOUNDRIES of the UNITED STATES ever published.

JUST PUBLISHED BY

THE

IRON TRADE REVIEW COMPANY,

27 Vincent St., Cleveland, O.

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	3.00@ 3.35
No. 1 Bessemer hematite	2.75@ 3.00
Hematites No. 1 non-Bessemer	2.25@ 2.50
No 1. Specular, non-Bessemer	2.50@ 3.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$10 40@$10 60
No. 1 Strong Foundry	11 25@ 11 75
No. 2 Strong Foundry	10 25@ 10 75
No. 1 Gray Forge, red short	9 75@ 00 00
No. 2 Gray Forge, neutral	9 50@ 00 00
No. 1 American Scotch	11 65@ 12 00
No. 2 American Scotch	11 00@ 11 50
Lake Superior Charcoal	14 00@ 15 00
PITTSBURG:	
No. 1 Foundry	$11 25@$11 75
No. 2 Foundry	10 50@ 11 00
Grey Forge	9 50@ 9 60
White and Mottled	9 00@ 9 25
Warm Blast Charcoal	18 00@ 19 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	10 50@ 00 00
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$15 00@$15 50
Local Coke Foundry No. 1	11 75@ 12 00
Local Coke Foundry No. 2	11 00@ 11 50
Local Coke Foundry No. 3	10 75@ 11 00
Local Scotch Foundry No. 1	12 00@ 12 50
Local Scotch Foundry No. 2	11 75@ 12 25
Local Scotch Foundry No. 3	11 25@ 11 75
Southern Coke No. 1	11 10@ 11 35
Southern Coke No. 2	10 25@ 10 50
Southern Coke No. 3	10 00@ 10 25
Southern No. 1 Soft	10 25@ 11 25
Southern No. 2 Soft	10 00@ 10 25
Southern Silveries No. 1	11 85
Southern Silveries No. 2	11 10
Southern Gray Forge	9 35@ 9 60
Jackson Co. Silveries	14 60@ 15 00
Ohio Silveries No. 1	14 25@ 14 25
Ohio Silveries No. 2	11 75@ 12 00
Ohio Strong Softeners	12 60@ 12 85
Alabama Car Wheel	17 00@ 17 50
Southern Charcoal No. 1	15 50@ 16 00
Southern Charcoal No. 2	15 00@ 15 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$11 00@$11 25
Southern Coke No. 2 and No. 1 Soft	10 00@ 10 25
Hanging Rock Coke, No 1	12 50@ 13 00
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Stone Coal No 1	14 50@ 16 00
Southern Coke, Grey Forge	9 50@ 9 75
" " Mottled	9 25@ 9 50
Standard Alabama Car Wheel	16 75@ 17 50
Tennessee " "	16 00@ 16 50
Lake Superior " "	16 50@ 17 00
BUFFALO (reported by Rogers, Brown & Co.)	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$12 00
No. 2 Foundry Strong Coke Iron Lake Superior Ore	11 50
Ohio Softener No. 1	12 00
Jackson Co. Silvery No. 2	15 00@ 16 00
Lake Superior Charcoal	14 75
Tennessee Charcoal	15 50
Southern Soft No. 1	12 00
Southern Soft No. 2	11 40
Alabama Car Wheel	16 00@ 17 50
Hanging Rock Charcoal	18 50
LOUISVILLE (reported by Geo. H. Hull & Co.)	
Southern Coke No. 1 Foundry	$11 50@$11 50
Southern Coke No. 2 Foundry	9 00@ 9 50
Southern Coke No. 3 Foundry	8 50@ 8 75
Grey Forge	8 25@ 8 75
Spathite	11 25@ 11 75
Southern Charcoal No. 1 Foundry	12 50@ 13 50
Car Wheel	15 00@ 15 50
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$11 00@$11 75
Southern Coke No. 2	10 50@ 10 75
Southern Coke No. 3	10 25@ 10 50
Southern Grey Forge	10 00@ 10 25
Southern Charcoal No. 1	15 50@ 16 00
Missouri Charcoal No. 1	12 00@ 12 50
Ohio Softeners	14 50@ 15 00
Lake Superior	16 50@ 17 00
Southern	17 00@ 17 50
Connellsville Coke, St. Louis	4 50

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	GROSS TONS
Old iron rails	$13 00
Old steel rails	10 50
	NET TONS
No. 1 R. R. wrought scrap	$10 00
No. 1 wrought scrap	9 50
No. 1 Machine cast scrap	8 50
Iron axles	15 50
Axle turnings	8 00
Wrought turnings (free from cast)	7 00
Cast borings	5 00
Uncut wrought iron boilers	4 00
Steel boiler plates	9 00
Grate bars	4 00
Pipes and flues (clean)	7 00
Tank iron	6 75
Hoop and band iron	5 00
Sheet iron	5 00
Wrought drillings	6 50
Malleable iron	7 50

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.

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283 W. River St., CLEVELAND, O.

Power Presses, Dies,
Drop Hammers, Punches and
Shears, Special Machinery,
Wire Cutters and Straighteners.

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WOOD-WORKING MACHINERY

Especially adapted

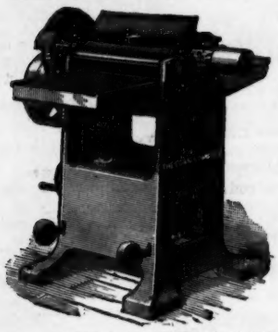
For PATTERN MAKERS

and

General

WOOD WORKERS,

Etc.



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Planes 18 in. wide and up to 6 in. thick.
No. 2—24 in. wide and up to 6 in. thick.

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251 to 271 W. Front St., CINCINNATI, O., U. S. A.

We swept the field in the way of honors at the

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Our machines are

PERFECT PRODUCERS of PERFECT PRODUCTIONS

PERFORATED METALS

OF ALL KINDS FOR

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PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.

LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.

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SHEETS, BARS, SLABS AND BILLETS.
Light Sheets for TINNING AND PERFORATING a Specialty.
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DIXON'S PERFECT LUBRICATING GRAPHITE.

The most Marvelous Lubricant Known.
Used Dry, or Mixed with Water, Oil or Grease

NOT AFFECTED BY HEAT, COLD, STEAM OR ACIDS.

An Interesting and Instructive Pamphlet will be sent Free of Charge.

JOS. DIXON CRUCIBLE CO. Jersey City, N. J.

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g,

CLEVELAND, OHIO.

Trade Mark Patented.

ORDER DIRECT FROM THE

Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	1.20c@1.30c
Angles	1.25c@1.35c
Tees	1.35c@1.45c
Universal Plates	1.25c
Sheared Plates	1.35c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1¼ to 4 by ⅜ to 1 inch	1 30
4½ to 6 by ⅜ to 1 inch	1 35
1¾ to 6 by 1⅛ to 2 inch	1 50
1½ & 1¾ by ⅜ to ¾ inch	1 35
1 & 1¼ by ⅜ to ¾ inch	1 40
⅝, ⅜, ⅞, by ⅜ to ⅝ inch	1 50

Round and Square.

1 to 1⅞ inch	1 30
2 to 2⅝ inch	1 40
2¾ to 3¾ inch	1 55
3⅞ to 4 inch	1 80
4⅛ to 4⅝ inch	2 40
4¾ to 5 inch	2 60

Oval.

⅜ to 1¼ inch	1 50
⅝ to ¾ inch	1 50
½	1 70
⅜	1 90

Half Oval and Half Round.

1¼ to 3 inch	1 85
⅜ to 1⅛ inch	1 65
⅝ to ¾ inch	1 90
½	2 05
⅜	3 15

Heavy Band.

1¾ to 6 by ¼ and 5-16 inch	1 40
1 to 1⅜ by ¼ and 5-16 inch	1 45
⅜ to ⅞ by ¼ and 5-16 inch	1 55
½ to ¾ by ¼ and 5-16 inch	1 80

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 85
1 7-16 to 2, No. 17, 18 and 19	1 90
1 7-16 to 2, No. 20	2 00
1 7-16 to 2, No. 21	2 10
1 7-16 to 2, No. 22	2 20
1½ to 1⅜, No. 13, 14 and 15	1 90
1½ to 1⅜, No. 16, 17 and 18	1 95
1½ to 1⅜, No 19 and 20	2 00
1½ to1⅜, No. 21	2 10
1½ to 1⅜, No. 22	2 20
15-16 and 1 inch, No. 13, 14 and 15	1 85
15-16 and 1 inch, No. 16, 17 and 18	2 00
15-16 and 1 inch, No. 19 and 20	2 10
15-16 and 1 inch, No. 21	2 20
15-16 and 1 inch, No. 22	2 30
⅞, No. 13, 14 and 15	2 10
⅞, No. 16. 17 and 18	2 20
⅞, No. 19 and 20	2 30
⅞, No. 21	2 40
⅞, No. 22	2 50
13-16, No. 13, 14 and 15	2 20
13-16, No. 16, 17 and 18	2 30
13-16, No. 19 and 20	2 40
13-16 No. 21	2 50
13-16, No. 22	2 60
¾, No. 13, 14 and 15	2 30
¾, No. 16, 17 and 18	2 45
¾, No. 19 and 20	2 55
¾, No. 21	2 65
¾, No. 22	2 75
11-16, No. 13, 14 and 15	2 55
11-16, No. 16, 17 and 18	2 60
11-16, No. 19 and 20	2 70
11-16, No. 21	2 80
11-16, No. 22	2 90
11-16, No. 23	3 00
⅝, No. 13, 14 and 15	2 60
⅝, No. 16, 17 and 18	2 70
⅝, No. 19 and 20	2 80
⅝, No. 21	2 90
⅝, No. 22	3 00
⅝, No. 23	3 10
9-16, No. 13, 14 and 15	2 80
9-16, No. 16, 17 and 18	2 90
9-16, No. and 20	3 00
9-16, No. 21	3 10
9-16, No. 22	3 20
9-16, No. 23	3 30
7-16 and ½ inch, No. 13, 14 and 15	3 00
7-16 and ½ inch, No. 16, 17 and 18	3 10
7-16 and ½ inch, No. 19 and 20	3 20
7-16 and ½ inch, No. 21	3 30
7-16 and ½ inch, No. 22	3 40
7-16 and ½ inch, No. 23	3 50
⅜, No. 13, 14 and 15	3 50
⅜, No. 16, 17 and 18	3 60
⅜, No. 19 and 20	3 70
⅜, No. 21	4 00
⅜, No. 22	4 10
⅜, No. 23	4 25

Light Band.

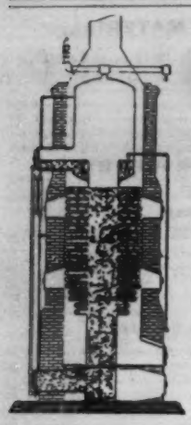
1¼ to 6 by ⅛ to 3-16 inch	1 60
1½ to 6 by Nos. 11 and 12	1 65
1 to 1⅜ by ⅛ to 3-16 inch	1 65
1 to 1⅜ by Nos. 11 and 12	1 70
⅞ and 13-16 by ⅛ to 3-16 inch	1 80
⅞ and 13-16 by Nos. 11 and 12	1 85
¾ and 11-16 by ⅛ to 3-16 inch	1 90
¾ and 11-16 by Nos. 11 and 12	1 95
⅝ and 9-16 by ⅛ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 12	2 10
½ by ⅛ to 3-16 inch	2 20
½ by Nos. 11 and 12	2 25

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	1 80
⅞ inch, " " " " 13 and 14	1 90
¾ inch, " " " " 11 and 12	1 95
¾ inch, " " " " 13 and 14	2 15

Sheet Iron.

No. 10	1 85
No. 12	1 90
No. 14	1 95



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WATER TUBE BOILER.

This Boiler is absolutely safe from explosion. Gives as much steam from the waste heat as any boiler made. Easy of access for cleaning and repairs. Furnishes perfectly dry steam. Occupies little ground space. Economical in first cost. Send for complete circulars giving list of users and testimonials, one of which is printed below.

The Falcon Tin Plate & Sheet Co., }
NILES, O., Aug. 18, 1893. }

Chas. P. Adams, Esq.

Dear Sir: The three boilers of 225 H. P. each which you furnished us are working in every way satisfactory. We consider them as good steamers as any we have ever used. Up to the present time have spent nothing on them for repairs. Very respectfully,

THE FALCON TIN PLATE & SHEET CO.,
By Warner Arms, Pres't.

C. P. ADAMS.
807 The Cuyahoga, - CLEVELAND. O.

FUEL OIL BURNERS.

J. R. Armstrong's System of Burning

Crude Petroleum.

WHY IT IS THE BEST.

Send for Catalogue.

JOHN R. ARMSTONG COMPANY,
35 West Monroe St., Chicago, Ill.

WIRE ROPE
FOR ALL PURPOSES.
IRON AND STEEL WIRE OF ALL KINDS.
TRENTON IRON CO.
NEW YORK OFFICE. COOPER HEWITT & CO. 17 BURLING SLIP
TRENTON, N.J.
WIRE ROPE — TRAMWAYS

The Iron Trade Review

Pays special attention to iron ore, blast furnace, rolling mill, foundry and machine shop interests. Per year **$3.00.**

HERCULES POWDER

SEND FOR DESCRIPTIVE PAMPHLET.

Stump before a blast. | Fragments after a blast.

HERCULES,
THE GREAT STUMP AND ROCK
ANNIHILATOR.

STRONGEST and SAFEST EXPLOSIVE
Known to the Arts.
POWDER, FUSE, CAPS,
Electric Mining Goods,
AND ALL TOOLS FOR STUMP BLASTING,
FOR SALE BY THE
HERCULES POWDER COMPANY,
710 Cuyahoga Bldg., Cleveland, O.
J. W. WILLARD, Manager.

No. 15-17	2 05
No. 18	2 20
No. 20	2 30
No. 22-24	2 40
No. 25-26	2 50
No. 27	2 60

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 60
Shell	1 85
Flange	2 10
Marine Flange	2 35
Fire Box	3 35

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. ℔. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s.
1 to 2 in. inclusive	08
9-16 to ½ in. "	08½
7-16 to ⅜ and 2⅜ to 3 in.	09
3⅛ to 4 in.	09½
⅜ to 11-16 and 4⅛	10
⅛ to 6 in.	10½
¼ to 9-32 and 6⅛ to 7 in.	11
3-16 in	13

Flats.

	cts. ℔s.
2 to 9-16 in. wide by 2 to ⅝ thick	8

Bessemer and O. H. Steel.

Machinery	base price, 1 80
Tire	" 1 85
Spring	" 2 20
Sleigh Shoe	" 2 20
Toe Calk	" 2 05
Cutter Shoes, tapered and bent	" 2 45

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 70
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 40

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ lb 9@10
Wright's	℔ lb 12

Bellows.

Blacksmiths' Hill's	dis 40
Blacksmiths' Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&5
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 25
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 35
Horton's Universal	dis 40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

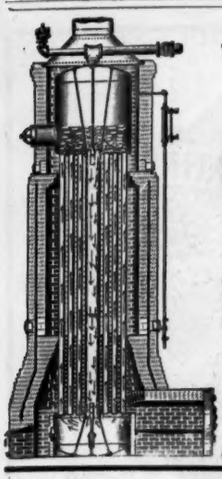
Cast Steel	℔ 3½
Iron, steel points	℔ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 46 gr.	54 to Flour, 150 gr.	C. F F. FP.
Kegs, ℔	4½c	5 c	2½c
½ kegs ℔	4¾c	5¼c	2¾c
¼ kegs ℔	5 c	5½c	3 c
10 ℔ cans, 10 in case	6 c	6½c	5 c
10 ℔ cans less than 10	10 c	10 c	7½c



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SOLE BUILDERS OF THE

Cook Patent Water Tube Boiler

THE ONLY PERFECT WASTE-HEAT BOILER.

No incrustation.
Generates the greatest amount steam with least amount heat.
Repairs reduced to a minimum.
Can be used equally as well for direct firing or with natural gas.

WE ARE ALSO BUILDERS OF

HORIZONTAL, TUBULAR, AND FLUE BOILERS, OIL TANKS AND WATER STAND PIPES.

☞Estimates furnished promptly on receipt of specifications.

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MINING MINERAL AND TIMBER LANDS.

Municipal Bonds, Large Tracts of Florida
Farm and City Mortgages, Phosphate and
Short Time Paper. Hammock Lands.

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All parts held together by a pin inside of box; no losing of pawls or rollers. It can be adjusted quickly and be bought cheap. Both large and small sizes. Write for prices and terms. Address,

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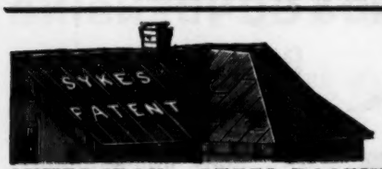
CLEVELAND, - OHIO,

—MANUFACTURERS OF—

BESSEMER AND OPEN-HEARTH STEEL,

Blooms, Billets, and Slabs, Steel Rails, Steel Beams, Channels and Angles. Steel Forgings, Bar Spring, and Sleigh Shoe Steel. Steel Wire of all kinds. Barbed Wire, Iron and Steel Plates, Galvanized and Black Sheet Iron and Steel Corrugated Iron Roofing.



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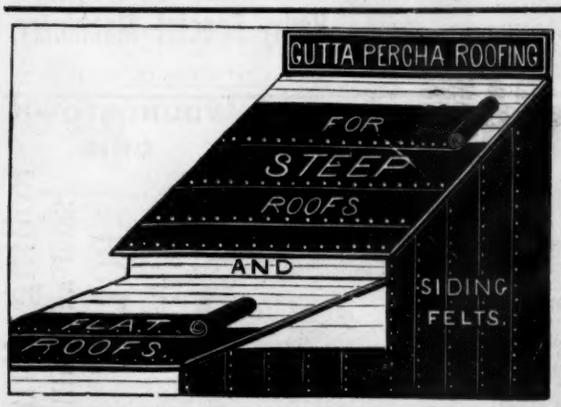
We are the only Steel Roofing Co. awarded Medal and Diploma for **PATENT CAP ROOFING** at World's Columbian Exposition. We are also large manufacturers of all styles of METAL ROOFING, SIDING, CEILING, ETC. Send for Catalogue and Price List. Mention this paper.

SYKES IRON & STEEL ROOFING CO., • Chicago and Niles, O.



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ROOFING

For Iron Works, Foundries, Mills and Factories.

Elastic Paint for Metal Roofs and Siding only 60c. per gallon in bbls.

Send for Catalogue and references from hundreds of the largest Manufacturing firms in the United States. Also Water Proof Siding and Sheathing Paper.

Empire Paint & Roofing Co.,
111 N. Fourth St.,
PHILADELPHIA, PA.

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 55@60
Norton's	dis 55@60
Grant	dis 55@60
Sterling	dis 60
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	15c
" " " " over 5 lbs	12c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3¼	3½
Hexagon	15½	11½	8½	6	5½	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ¼ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ¼ keg card rate	
Car lots	$1.20
Less than car lots	$1.35

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ¼ doz	dis 10@10&10

Packing, Steam.

Boston Belting Co.	dis 60
American Packing Hemp	¼ lb 9@10
Russia " "	¼ lb 14
Italian " "	¼ lb 13@19
Plumbago Piston	¼ lb 40
Peerless	¼ lb 60
Morrison's "	¼ lb 45
Square Flax "	¼ lb 50
Sheet Rubber	¼ lb 12&24
Excelsior Rubber	¼ lb 48
Rainbow { Full Rolls	45c ¼ lb
Rainbow { Less than Full Rolls	50c ¼ lb
Eclipse Gasket	¼ lb 75

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 55@60

Rivets.

Iron, Thousand, list November 17	dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17	dis 50&10@60
Copper	dis 50@50&10

Saws.

Disston's Circular	dis 40&10
" Band	dis 25
" Scroll	Net
Hack Saw Stubs	dis 20
" " Eureka	dis 20
" " Star	dis 20
Saw Swages Diston's	dis 30
Atkins' Circular Saws	dis 40&45
" Mill, Mulay and Drag Saws	dis 40&10
" Wood Saws	dis 40&10
" Silver Steel Diamond Cross-cut Saws	70c per ft
" Dexter Cross-cuts	50c "
" Diamond "	30c "
" Tuttle Tooth Cross-cuts	25c "
" One-man Cross-cuts	32c
No. 1 Handles	23c per pair
No. 6 "	16c "
Excelsior Saw Tools	$6 per doz
Derfection "	$15 "
Petroit Saw Works, Circular	dis 50
" " " Band	dis 25
" " " Mulay	dis 45

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 75
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Jan. 18, 1894

Brass	dis 30
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

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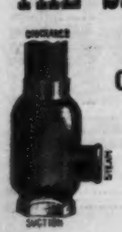

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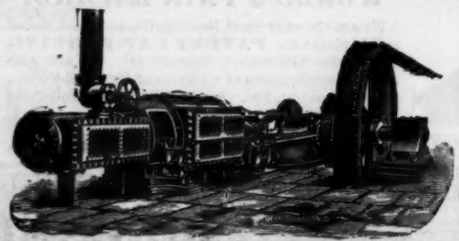

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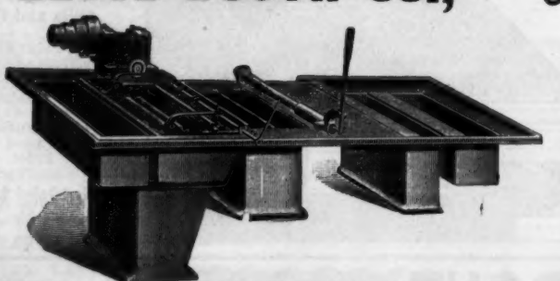

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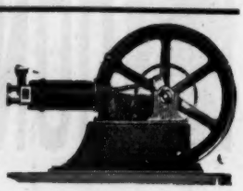

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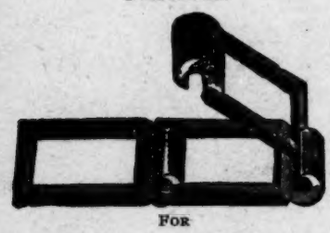

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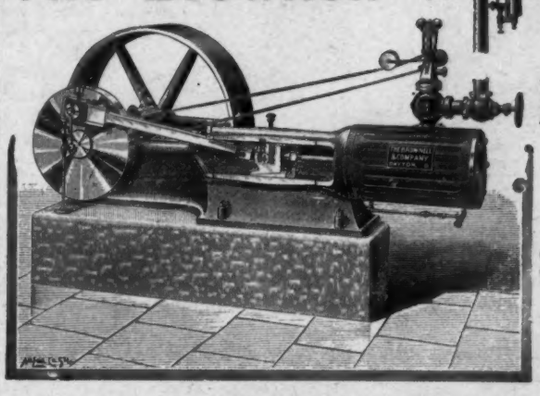

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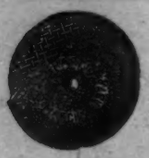

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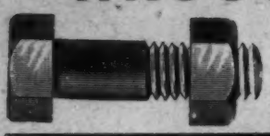

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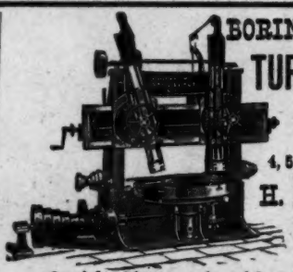

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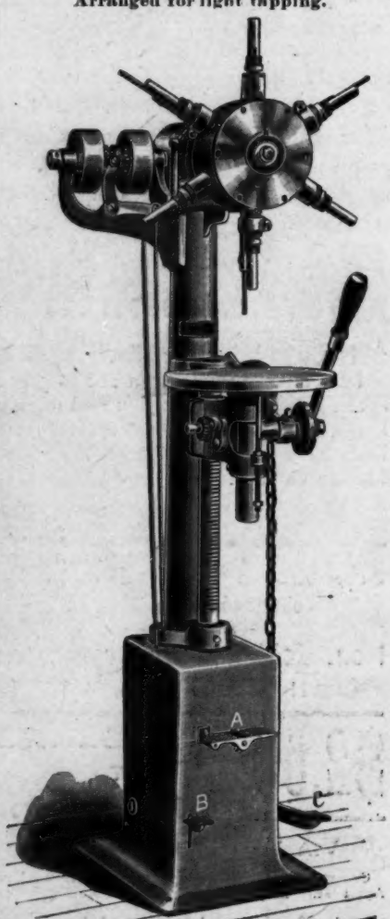

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